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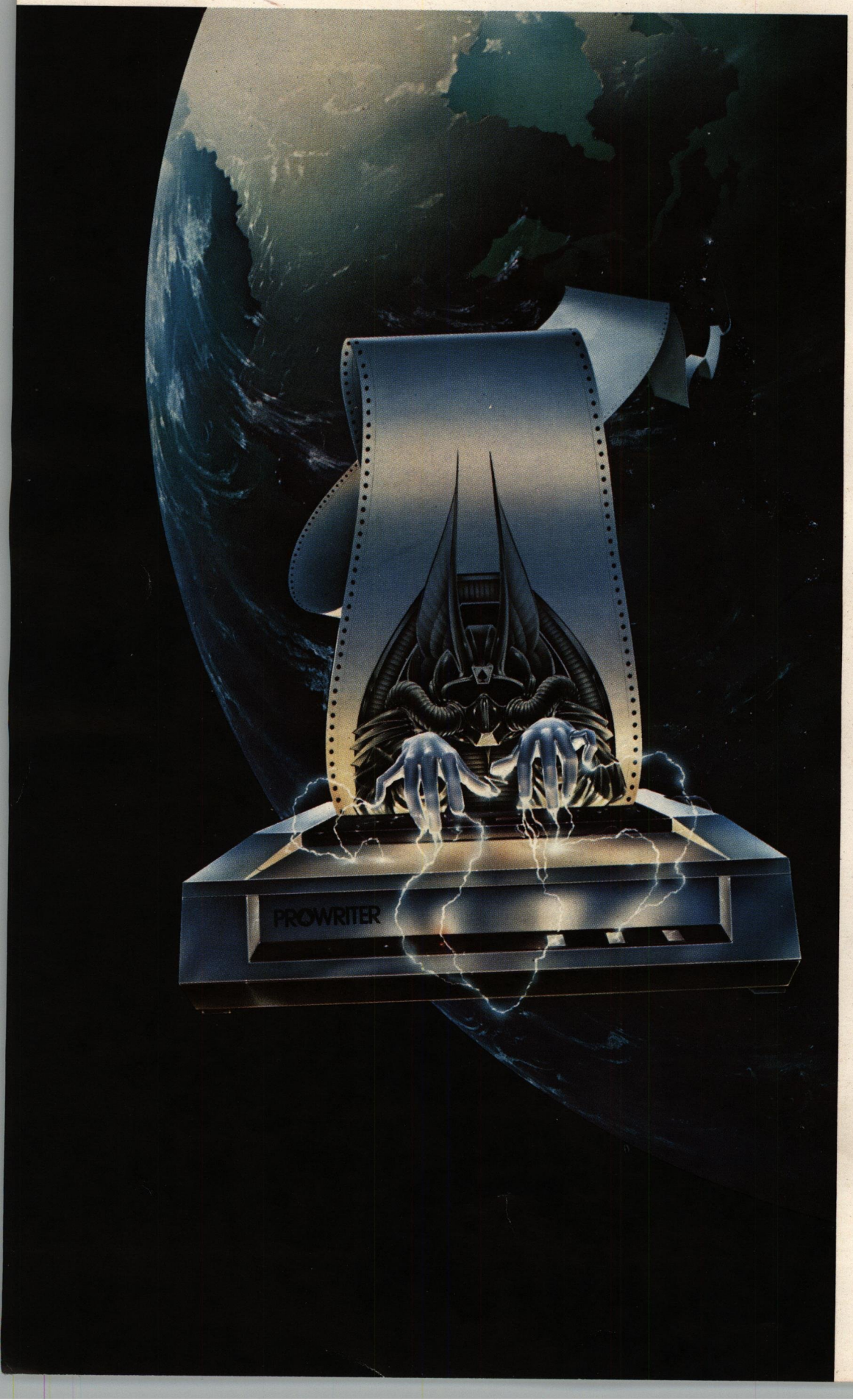

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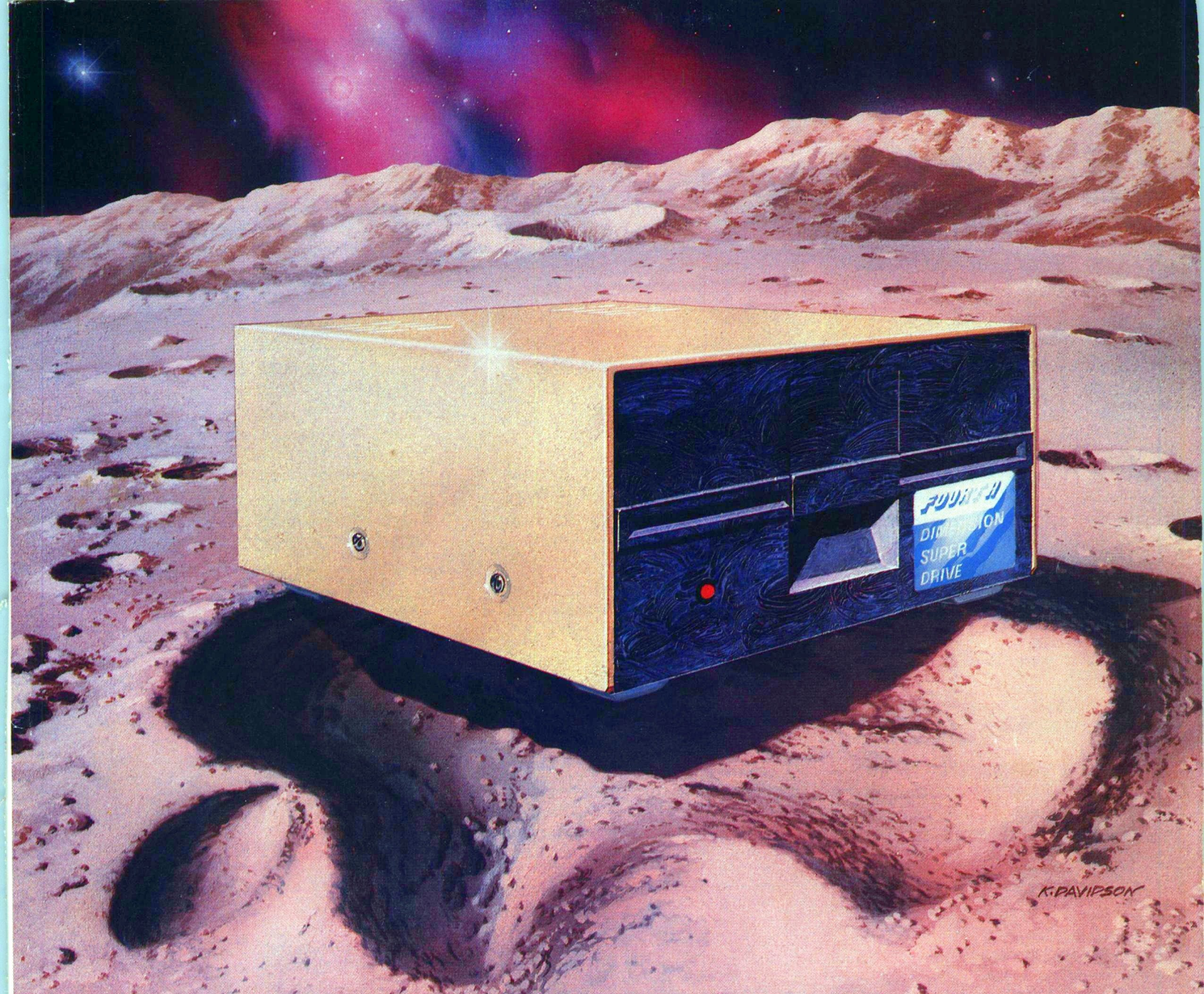

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Guest Speaker
Dr. Alistair D.C. Holden/Speech Recognition

7:30 PM, Tuesday, July 20th, 1982

Omega/Bellevue
835 106th N.E., Bellevue

Guest Speaker
Wayne Erickson/DB Management

Special Meeting
7:30 PM, Tuesday, Aug. 3, 1982

Guest Speaker
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THE EDITOR BYTES BACK

the editor

PERHAPS one of the ongoing events in the production of **Call -A.P.P.L.E.** that may be of interest to the readers, is how a simple story idea can mutate into a full-blown feature section, and some of the research that our authors put into the development of an article. In this case we had promised for this issue, **Reflections on the 6502,** a look at some [generally] unknown 6502 instructions, based on material published by **Bob Sander-Cederlof** in his excellent **Assembly Lines** newletter. In the process of verifying some of Bob's data, we found that **Roger Knights** had some excellent ideas on how the "new" instructions should be named, and further, some ideas on standards for assembler pseudo-ops. It all boils down to a great deal more than we anticipated, and we are currently building it into a feature section. We fully expect to publish it next month, but please don't hold us to it.

Now, however, back to the present. Get set for some great stuff in this issue. You'll find, we believe, **EXPLORING THE WORLD OF APPLE: Video Interfacing** of interest, particularly if you had problems getting your late model TV to respond properly to your Apple. **Jim Hockenhull** illuminates some of Apple's non-standard video characteristics.

Jack Bender makes his initial appearance in our pages with some basic application notes for **Pitch and Rhythm on the Apple,** with some ideas to prod your musical development.

CALL -A.P.P.L.E. TECHNIQUE is highlighted in a first appearance by **Don Taylor,** whose **Lets RESUME at your Place** offers some practical solutions to the ONERR/RESUME syndrome, where you never really get back to where you wanted to RESUME.

Tom Little also joins the ranks of first time contributors as he explores the intricacies of Apple's I/O system in the first part of a two part feature: **Ins and Outs.** If you have ever wondered about those $C000 addresses that don't really exist, this is for you.

Staff writer **Lee Reynolds** has come up with one of the neatest utility ideas in **FILEDUMP: A New DOS Command** that we've seen in a long time. FILEDUMP is a short machine language program that reads and displays any sequential text file to your screen.

An application program that many of you can put to immediate use is **Mike Firth's Calendar Subroutine.** This winner prints month after month of calendars, starting with the day, month and year specified by the user. It is accurate for several hundred years.

It seems like we always run out of space at this same place each month; perhaps it is just as well, since it gives us the opportunity to refer you back to the contents page to see what else is in store for you this month.

We already told you about our "biggie" for July, suffice to say we'll also have a balance of tutorial, utility, technical and beginners articles for you. . . . Don't touch that dial!

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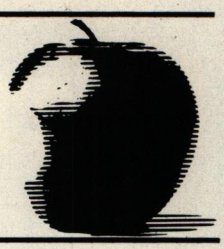

Val J. Golding

IT looks like we missed our deadline a couple of times recently; shame on us. This does not mean we have overlooked putting together some super specials to save our members lotsa bucks.

But first we have some other items of interest to pass on. We have been shipping copies of **Word Weaver** /// with preliminary documentation for some time now, but by the time you read this, you should have received your final copy. There is no charge for this update, so if you do not receive your copy within the next 30 days, please contact the main office with your membership number, date of order and Word Weaver /// serial number.

We have now shipped all back orders of **Big Mac.LC,** the language (or RAM) card version of our super macro-assembler/editor, one we feel is the finest available for the Apple. The standard version is just $22.50, and the Language card version, which works with most 80 column cards, is $28.50. We would like to remind those of you who purchased the LC version as their first copy, that two documents are included with it. The 72 page Big Mac manual proper contains all of the basic information and instructions, while the 32 page Language Card Supplement contains information concerning differences between that version and the standard. A new composite document will be made available later this year.

An addition to both versions of Mac is a fine symbol cross reference program by *Dale Waddell,* which for those owners of the standard version who do not plan to update, is available separately for $7.50.

Assembly Lines: the Book by *Roger Wagner,* is the newest publication to join our library. The low member price is $16.50, and it joins **Using 6502 Assembly Language** ($17.00) as another fine book for those of you who are interested in learning assembly from scratch. To this end we have thrown together a combination special which can save you $9.50 if you order all three (either phone ordered or postmarked by) July 31, 1982. Here is how it breaks down:

BIG MAC.LC	$28.50
Assembly Lines	$16.50
Using 6502	$17.00
Total	$62.00
Member price	**$52.50**

Even if you don't know have a Language or RAM Card, you can still save money, since a copy of the standard Big Mac is on the .LC diskette.

Two closeouts remain in effect until our supply is exhausted. The **Wozpak,** a combination of Integer Basic and Assembly Language documentation and program diskette, which normally sells for $37.50, is going for the price of the Wozpak alone, $20. Then we have **Program Line Editor 2.0,** a program we personally could never do without, at only $20, pending release of the new **Global Program Line Editor** next month. Note that GPLE is a virtually new program from the ground up, although it incorporates all of the original PLE features, thus **NO UPDATES WILL BE OFFERED**

That brings us to the all new **Global PLE.** GPLE is our newest product which we again expect to set standards for all similar programs to follow. GPLE will check to see whether or not you have a language card, then load the appropriate version. GPLE has many new features, which include entering new escape macros from the keyboard and a larger escape table, global search, edit and replace, list from line number and list by page, nestable macros, typeahead buffer and compatibility with 80 column cards. A commerical version will sell for far more than the $38.50 price we offer it to members for, just one more example of the low-priced quality software and publications we make available to our members. We expect GPLE to be available in June. However, so that any other products you may wish to order at the same time do not get held up, *we recommend sending a separate order for GPLE.*

And with these tantalizing temptations we shall leave you for this month with the problematic poser: how best can you blow your dough!

```
]LIST

10  REM
SO WHAT DID YOU EXPECT DEPT

(STOLEN FROM ALAN BAXTER/APPLE
CORE OF SAN DIEGO)
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20  TEXT : HOME : DIM Q(16):R = 1
    167
30  CALL  - 1184: FOR M = 1 TO 80
    0: NEXT
40  FOR I = 1 TO 16: READ Q(I)
50  FOR P = R TO R + 768 STEP 128
    : POKE P - 128,160: FOR M =
    1 TO 50: NEXT M: POKE P,Q(I)
    : NEXT P
60 R = R + 1: NEXT I
70  VTAB 23: END
100  DATA 67,65,76,76,96,109,65,1
    10,80,110,80,110,76,110,69,1
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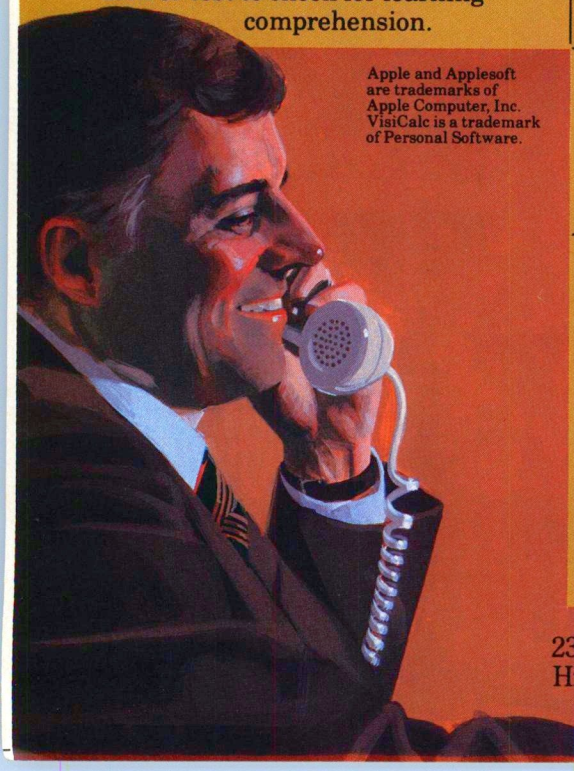

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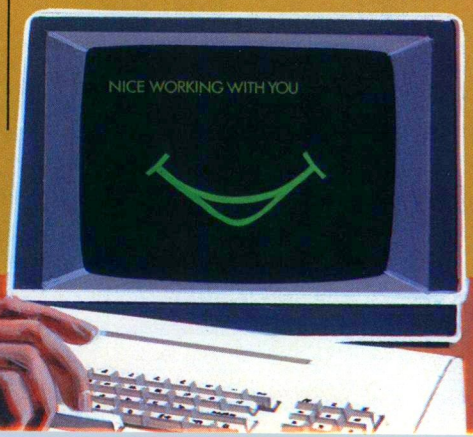

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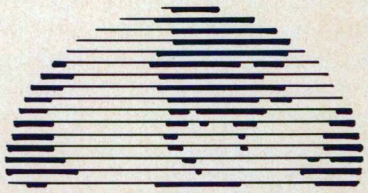
EXPLORING THE WORLD OF APPLE:

Video Interfacing

Jim Hockenhull



Introduction

THE Apple][is well known for its remarkable capabilities for color video graphics. I'm sure that this feature has caused many to buy an Apple rather than some other computer. But those who envisioned serious video applications such as tape recording or broadcasting have been disappointed; the Apple will not interface with standard professional equipment. Something is wrong with its video signal. In this article I will explain (gently, I hope) what a video signal is, describe some of the non-standard characteristics of Apple's signal, and discuss some devices designed to correct the problem and enhance Apple's usefulness as a video tool.

What goes on in there?

The image-producing element of a television set or computer terminal is the picture tube or CATHODE-RAY TUBE (CRT). Its glass face is coated with a phosphorescent material which will glow for a short time when struck by a concentrated beam of electrons. Such a beam is emitted by an ELECTRON GUN at the rear of the tube. It is tightly focused, producing a tiny dot of light on the tube's face, a dot whose luminosity can vary from as-bright-as-possible to as-dark-as-possible in proportion to the intensity of the electron beam. (These two extremes are referred to as "white" and "black" even though they may actually be shades of gray.)

The dot can be placed anywhere on the tube's screen by deflecting the path of the electron beam. Much as a half-tone photograph in a newspaper creates the impression of a continuous range of tones through the use of tiny dots of black and white, so a video image is "painted" by sweeping the electron beam back and forth across the face of the picture tube, varying its intensity to correspond with that of the image being transmitted, whether from a TV camera or a computer.

The path traveled by the beam is shown in simplified form in Figure 1. In a standard video system the beam begins in the upper left (facing the CRT screen) at position 1 and sweeps across to position 2 creating one extremely narrow horizontal section of the picture (a LINE) on the tube's face. At point 2 the beam is BLANKED, that is, turned off or set to "black," and moved very rapidly over to point 3. There it is turned back on and begins another sweep, toward point 4. Sweeping from left to right and proceeding from top to bottom, the beam builds up a video picture one horizontal line at a time.

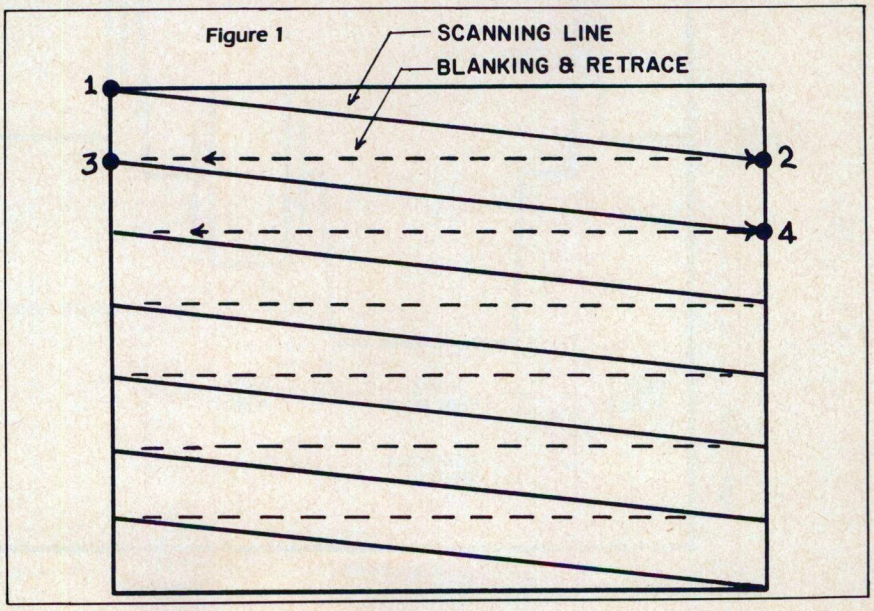
The system of human visual perception exhibits a phenomenon known as PERSISTENCE OF VISION: an after-image remains for a short time after the actual image is gone. Persistence of vision allows us to see a rapidly-changing succession of still photographs as a moving picture, and allows us to perceive a swiftly-moving phosphorescent dot as a coherent video image.

...human visual perception exhibits a phenomenon known as persistence of vision.

When one such image or FRAME has been built the electron beam, now at the bottom of the screen, is blanked again, moved back to the top, and turned on once more. The whole procedure then starts again. If anything has changed in the transmitted image since the last frame was built, that new picture information will appear in the new frame. Thus a series of static frames is produced and persistence of vision lets us interpret it as a smoothly-moving video picture.

The electron beam's pattern of horizontal and vertical movement is called the RASTER. (The accompanying box describes another kind of graphic display.) In the United States it is composed of 525 horizontal lines. The scanning of one such line, including blanking and retrace, takes 1/15,750 of a second, or 63.5 microseconds, fast work indeed.

Figure 1



VIDEO INTERFACING

At the transmitting end of a regular video system, the camera "sees" by scanning its subject matter in an identical manner: left to right, top to bottom with intervals of horizontal and vertical blanking. If a receiver is to reconstruct the image coherently it must stay "in step", sweeping when the camera sweeps, blanking when the camera blanks. To this end the system generates and processes an electronic waveform, the VIDEO SIGNAL, which contains not only information about the picture but also information needed to keep camera and receiver in synchronization.

A typical video signal is diagrammed in Figure 2. The horizontal axis represents the flow of time and the vertical axis the amplitude of the waveform. Information about details of the image, that is the camera signal itself, lies in a region of amplitude between "white" and "black". Interrupting the camera signal are steps reaching down to the black level; these are called the BLANKING SIGNALS. They effectively turn the electron beam off. All the picture information lying between two blanking signals represents one visible line of the raster.

...blanking signals effectively turn the electron beam off.

While the blanking signal is present another signal is sent. This appears in Figure 2 as a square wave descending from the blanking signal, extending into the "blacker than black" region. When received, it causes the blanked electron beam to retrace from the right side of the screen to the left. It is called the HORIZONTAL SYNCHRONIZING PULSE. Similarly, a VERTICAL SYNCHRONIZING PULSE occurs when the beam has reached the bottom of the screen. ("Synchronizing" is almost always shortened to "synch" when referring to these pulses.) Since the retrace from bottom to top takes longer than that from right to left, the vertical pulse is associated with a much longer blanking period. As the horizontal synch pulses cannot be interrupted, even during periods of blanking, they are imposed on the vertical signal. The receiver is able to separate the two and take appropriate actions to deflect the electron beam in the proper manner.

The video signal must also carry information about color. For this purpose a frequency of approximately 3.58 megahertz, the COLOR CARRIER, COLOR SUBCARRIER, or CHROMINANCE SUBCARRIER, is modified or modulated by two information-carrying voltages called the I and Q signals. This creates a set of related frequencies known as SIDEBANDS. In conventional modulation methods, the sidebands and the carrier frequency would be transmitted together. However, the intelligence or information is all contained within the sidebands; the carrier is needed simply as a reference to allow the receiver to reverse the modulating process and retrieve the intelligence. If the color carrier can be reconstructed by the receiver it need not be present in the transmitted signal. There is some technical benefit to be gained by not sending the carrier, so, in American practice, it is suppressed at the transmitter.

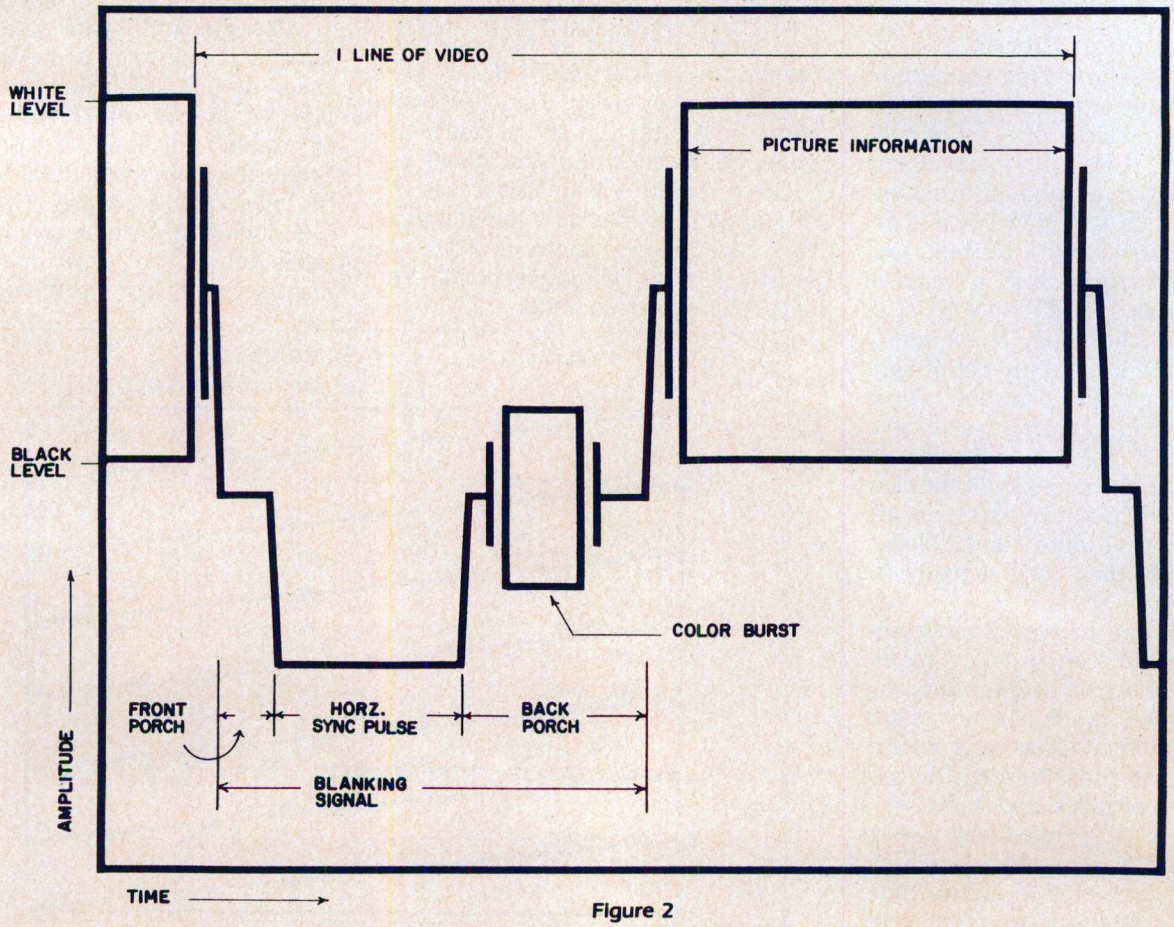


Figure 2

If the receiver is to reinsert the color carrier, it must generate a signal of the same 3.58 MHz frequency, which can be done with an oscillator, but that is only half the battle. The reconstructed carrier must also be IN PHASE with the original for the proper demodulation of the sidebands. To assure the correct frequency and phase relationships in the missing carrier, a short sample of the original is imposed on the video signal at regular intervals. This COLOR BURST sits on the quaintly-named BACK PORCH of each horizontal synch pulse. It must contain from seven to eleven cycles of the original color carrier signal, and must be of lower amplitude than the horizontal synch pulse so that the receiver's detection circuits can tell the two apart.

The color burst is a "sample" of the original color carrier.

When all of these signals — camera signal, horizontal synch pulse, vertical synch pulse, their attendant blanking periods, and the color burst frequency — are combined, the result is the COMPOSITE VIDEO SIGNAL. The timing of its component parts is carefully controlled to conform to industry standards which, in the United States, are set by the National Television System Committee (NTSC). A slight deviation from NTSC standard may cause the signal to be misinterpreted by video equipment or to be rejected entirely. Although the video signal generated by the Apple][computer is described in the *Apple][Reference Manual* as "NTSC compatible" and "similar to" Electronic Industries Association (EIA) standards, it in fact deviates significantly from standard in many critical areas.

Figure 3 shows the blanking/synch area of the Apple's signal superimposed over that of a standard signal. Several abnormalities are evident in the Apple waveform: the amplitude (the vertical dimension) of all elements is less than normal; there is no distinct front or back porch; the horizontal synch pulse is overly wide, pushing the color burst (which is also too wide) well into the area where the normal signal is producing picture information for the next line. There it cannot be detected by, say, a video tape recorder. Instead, the recorder will try to reinsert the burst where it is supposed to be-which is in Apple's blanking period. The result: severely scrambled color or no color at all.

Apple's signal deviates significantly from standard...

(Notice, too, that Apple's picture information stops much earlier and begins much later than standard. This is what causes the video image to be smaller than full screen.)

The Videotek oscilloscope used in obtaining these diagrams was unable to even recognize Apple's vertical synch pulse! That aspect of the signal will not be illustrated here. Obviously, the Apple][is a long way from NTSC standard.

As if that were not enough, there is one further complication. The NTSC standard video system constructs its pictures at a rate of 30 frames per second, a rate chosen because of its relationship to the 60 Hz frequency of American power lines. Unfortunately, pictures presented at 30 frames per second cause a noticeable amount of flicker. To correct this, the 525-line frame is divided into two FIELDS of 262.5 lines each. The electron beam first scans all the ODD-numbered lines, left to right, top to bottom, creating the first field. When done, it blanks, returns to the top of the screen, then scans the EVEN-numbered lines, the second field. The eye cannot perceive this split, so the EFFECTIVE RATE of presentation becomes 60 frames per second, a speed at which no flicker is apparent. Because of the meshing of odd and even lines, this technique is called INTERLACED

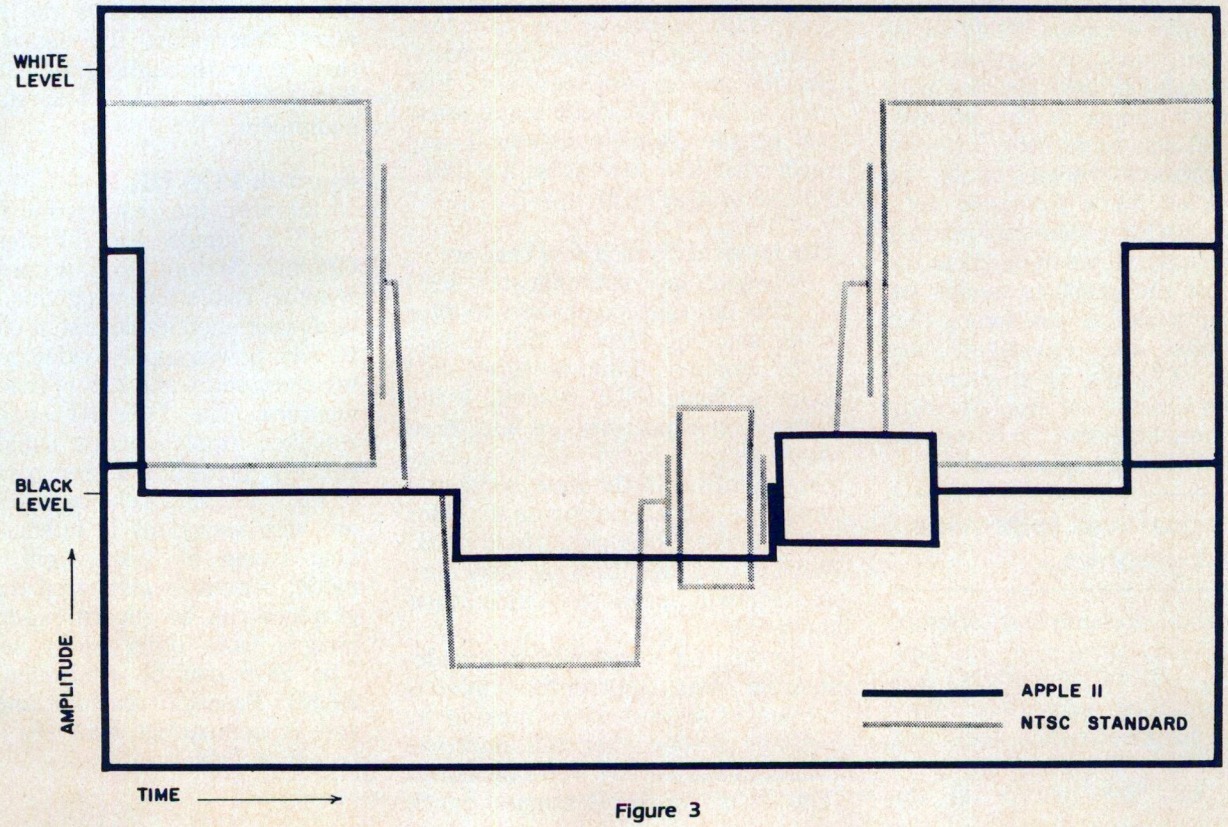


Figure 3

VIDEO INTERFACING

SCANNING. The Apple][, in a further deviation from standard practice, does not interlace, but instead scans the even-numbered lines twice.

Apple scans the even-numbered lines twice, instead of interlacing...

Visions of Apple's video applications begin to fade; its signal is aberrant enough to simply be unacceptable to most professional equipment. (In fact, my consulting work indicates that the Apple][may not even be compatible with all models of television sets through a radio frequency modulator.) Character generation and color graphics, no matter how impressive, will not have much value in video work, if that information cannot be gotten from the computer into the video system. Why is the Apple's signal the way it is? What, if anything, can be done to correct the problem?

Why so strange?

As we've seen so far, the generation of a standard video signal is a fairly complex business — and an analog business at that. The Apple's designers have approximated such a signal by digital means, using an ingenious combination of hardware and software, taking some liberties with the signal's timing in the process. Their goal was to provide low-cost color graphics which could be displayed on home television sets, and to do it with a minimum number of components. (If we think about the features of the graphics modes we are probably safe in concluding that the original use envisaged was G-A-M-E-S.) "It was never intended" says John Crossley of Apple's Technical Communications, "to be a studio quality NTSC video generator."

Apple's goal was to provide low-cost graphics...

Why, then, do some users attempt to hook the thing up to tape recorders, effects generators, and TV broadcasting equipment? Why are they surprised when they find they can't do it? I suggest it centers around that little phrase in the Reference Manual: "NTSC compatible." Surely we can't be considered too naive if we interpret that to mean that the Apple is compatible with NTSC equipment — *which it is not.* The folks in Cupertino might do future purchasers a favor by revising the small video portion of the manual to explain the compatibility limitations in a straightforward manner.

What can be done?

A substantial number of users want to harness Apple's graphic powers to do serious video work, so many that several companies are now manufacturing peripheral devices to help make such interfacing possible. In this section I will mention the products I know of and reiterate the performance claims of the manufacturers. Individual product reviews may be published as evaluation samples become available.

Time Base Correctors

Those with access to professional video machinery can try running the Apple signal through a time base corrector (TBC). The TBC is an analog-to-digital converter which takes the composite video signal, digitizes it, and re-times the result. As with any A-D converter, the more sophisticated the device the better the results. A good TBC is out of the monetary reach of most private computerists. Besides, my experience shows that even a good TBC can't make sense out of the Apple's video. If any reader has had success with a TBC, I'd like to hear of it.

Horizontal Synch Corrector:

(Symtec, Inc.; approximately $50.)

This little device appears to alter some counting rates in the Apple's video circuitry. Built on three dual inline package (DIP) headers, it fits between the motherboard and three Apple chips. It has the effect of chopping Apple's overly wide horizontal synch pulse in half, bringing the color burst into an area closer to normal. With it installed, at least *some* sort of color will appear on a video tape recording.

In the past it was sold on a made-to-order basis. Apparently Symtec is no longer interested in making it, perhaps feeling that the improvements gained weren't worth the effort. The circuit for the Horizontal Synch Corrector is a simple one, well within the capabilities of do-it-yourselfers. We can hope that someday Symtec will make it public knowledge.

Adwar Proc Mod:

(Adwar Video Corp.; approx. $300.)

The Proc Mod is a peripheral board which fits in Apple's Slot #7. It is designed, according to the manufacturer, to bring the Apple's synchronizing information to within NTSC tolerances for recording, meaning that 1/2" or 3/4" video tapes can be made and edited with stable color. The Proc Mod does NOT bring the signal up to broadcasting standards. For that purpose Adwar puts out another product.

Adwar ARS-170:

(Adwar Video Corp.; approx. $2800.)

Adwar's promotional literature points out that there is yet another flaw in Apple's video signal: it scans only 524 lines per frame instead of the standard 525. The ARS-170 corrects this and the other anomalies by "grabbing" an entire Apple video frame, storing it in on-board memory, then reading it out at the proper NTSC rate. It thus provides real-time operation with a one-frame delay. As I understand the preliminary description, the signal must then be run through a time base corrector for use with NTSC standard equipment.

Symtek PGS III:

(Symtec, Inc.; base price: $7050.)

PGS stands for "Professional Graphics System" and, according to Symtec, that's just what this device is. A rack-mountable unit, it contains its own power supply, video generating electronics, and 32K of read/write memory. The PGS III apparently remakes Apple's video capabilities entirely, providing screen resolution of 512 x 192, and a choice of 4096 colors with variations in intensity and hue. Using a "transparent pixel" mode, computer-generated text and graphics can be superimposed over images from other video sources. The PGS can be controlled from BASIC, Pascal, or machine language, and is compatible with the Apple Graphics Tablet.

Obviously, this unit is designed as a flexible character and graphics generator for broadcast television. Undoubtedly, it isn't something the average computer hobbyist is going to run out and buy, but then the average hobbyist probably doesn't need a broadcast-quality signal. Those who do should have a look at the PGS III.

Amdek DVM Board:

(Amdek Corp.; approx. $200.)

Unlike the other products mentioned here, the DVM (Digital Video Multiplexor) is not designed specifically to correct Apple's NTSC incompatibilities, but rather to split the signal into its red, green and blue (RGB) components so that the Apple may be connected to a high-quality RGB monitor, such as Amdek's own Color II, to give the best possible graphic reproduction. The DVM puts out not only the three color signals, but also horizontal and vertical synchronization signals. Now such an output can be combined into a composite signal by using a fairly common television gadget called a MATRIXER or ENCODER. If the DVM's synch signals are close enough to standard, it may be possible to get a decent tape recording in this manner. I hope to report on this and give a full-fledged review of this interesting product in a future issue of *Call -A.P.P.L.E.*

Conclusion: To generate its color video graphics, the Apple II makes some trade-offs, most notably in the timing of its composite video signal. The signal deviates from the standards set by the National Television System Committee to such a degree that a color video tape recording cannot be made from the Apple, nor will other broadcast quality equipment accept it.

"Peripherals to correct this problem are now on the market."

Peripheral devices designed to correct the problem are now on the market. Bringing the Apple's signal up to broadcasting standards is not a trivial matter; this is reflected in the price of the peripherals. It will be interesting to see if they lead to more widespread use of the Apple in video applications.

Another Display Technology

The raster display is only one type of computer graphics terminal. Another common display makes use of a DIRECT VIEW STORAGE TUBE. Superficially resembling a video cathode ray tube, it behaves like a CRT with a long-persistence phosphor screen. Once the electron beam traces a line from point X1,Y1 to point X2,Y2, the line remains on the screen for a long time — up to an hour. The image on a video CRT must be redrawn or REFRESHED, usually 30 times a second.

A storage tube allows lines to be drawn directly, by simply moving the beam from one point to another, eliminating the hardware and software needed to control a raster and refresh the screen. Diagonal lines on a storage tube are straight, not stair-stepped, and require no complicated line-drawing algorithms. On the other hand, the storage tube produces only one level of brightness, in any color you like, as long as it is green. And images cannot be erased selectively; either the whole screen is erased or nothing at all. Anything resembling true animation is impossible.

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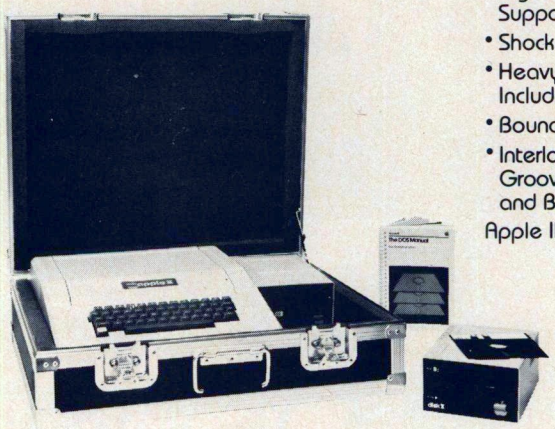

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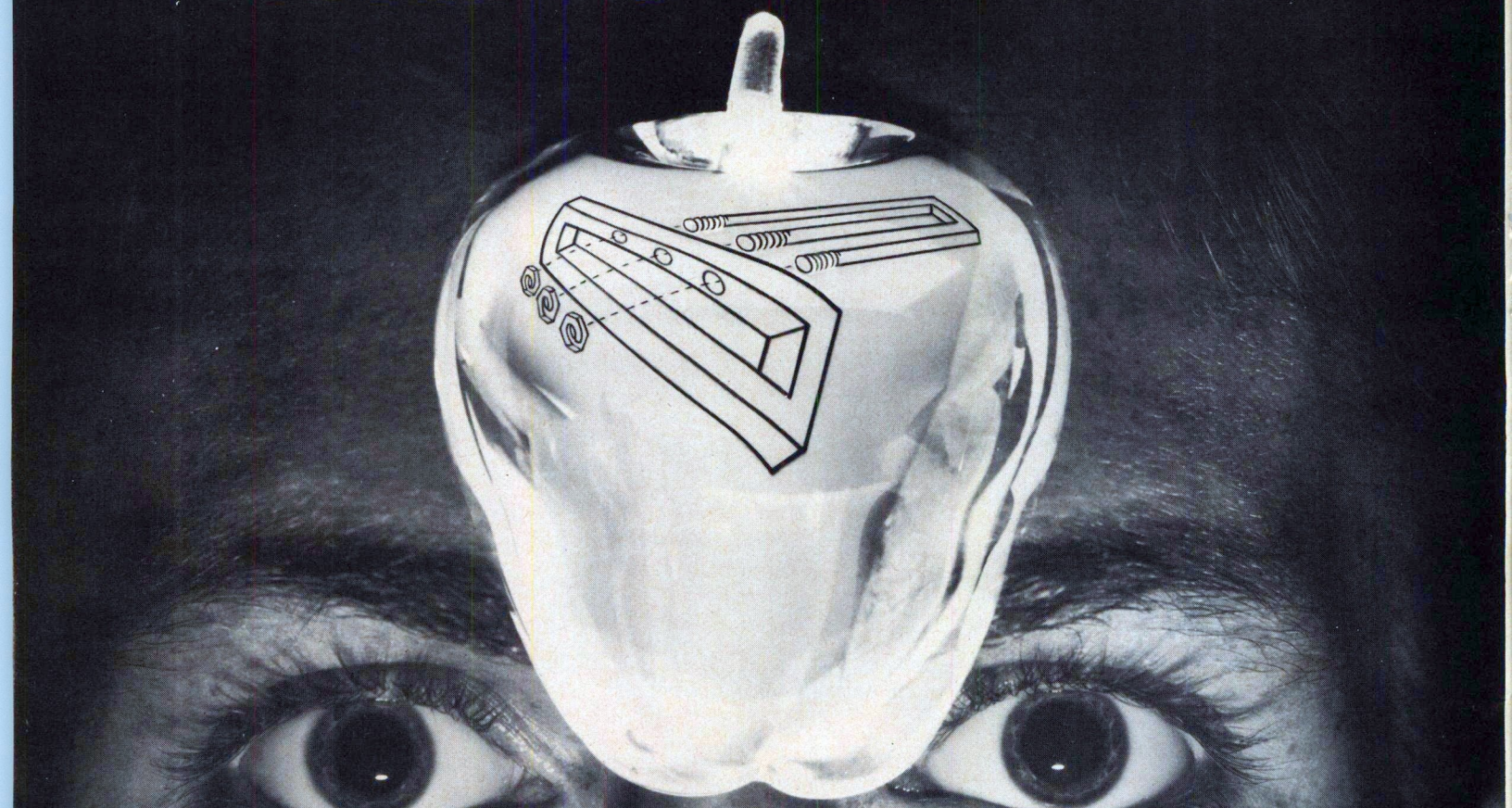

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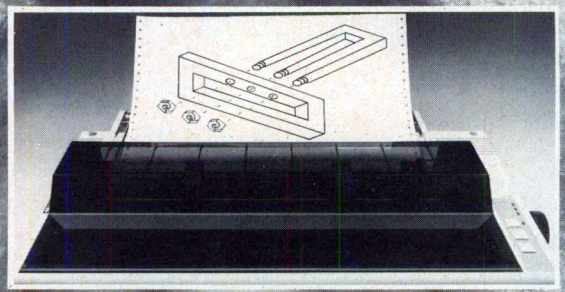

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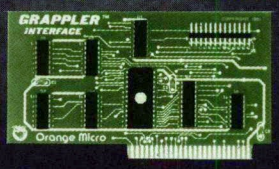

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A CALL —A.P.P.L.E. APPLECATION:

Pitch and Rhythm on the Apple

Jack H. Bender

MY thanks go to all of you who have contributed articles in Call -A.P.P.L.E. What a help they've been to this initiate. Take, for instance, Gene Jackson's Applesoft tone subroutine (Jan. 79). The subroutine opens the door to the world of music. Since I can't PEEK and POKE very well yet, I thought a brief discussion on music could be my first offering.

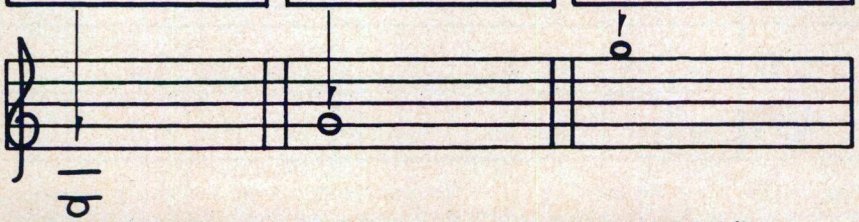
Listing 1 is the program which Gene contributed with the addition of a second set of READ, DATA statements. Listing 2 provides information for the notes of a particular song. Two pieces of information are needed – pitch and duration.

Listing 1 and 2 are located on page 86.

Let's look at pitch first. Chart 1 gives the values most likely needed for reproducing your favorite songs. Notice at the octave (the next higher note with the same alphabetic name) the value has decreased by one-half. Boxes with two note names in them indicate notes which are placed differently on the staff, but *sound* the same. These values are not totally accurate, but your ears will not be bothered by any small numeric deviation. I did make an attempt to give values with A=440 as the standard.

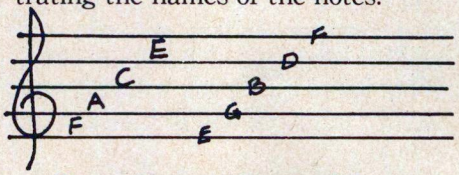
CHART 1

G = 128	G = 64	G = 32
F#/G♭ = 136	F#/G♭ = 68	F#/G♭ = 34
F = 145	F = 72	F = 36
E = 152	E = 76	E = 38
D#/E♭ = 162	D#/E♭ = 81	D#/E♭ = 40
D = 172	D = 86	D = 43
C#/D♭ = 182	C#/D♭ = 91	C#/D♭ = 45
C = 192	C = 96	C = 48
B = 204	B = 102	B = 51
A#/B♭ = 216	A#/B♭ = 108	A#/B♭ = 54
A = 230	A = 115	A = 57
G#/A♭ = 242	G#/A♭ = 121	G#/A♭ = 60
G = 255	G = 128	G = 64



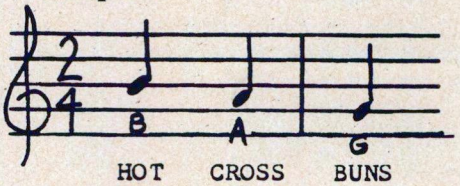
RESTS LACK PITCH. THE PITCH VALUE FOR RESTS IS ZERO (Ø).

For those of you who need a refresher, here is the staff illustrating the names of the notes.



To see if you understand the pitch chart, try finding the values of the following notes:

Example 1

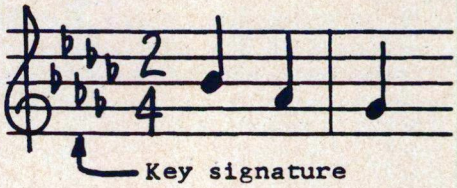


HOT CROSS BUNS

Correct! B=102 A=115 G=128

Pitch is fairly straight forward. Just watch out for the "key signature." The key signature alters notes throughout the song.

Example 2

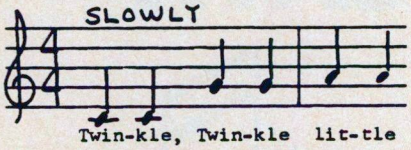


The note names are now B-flat, A-flat and G-flat.

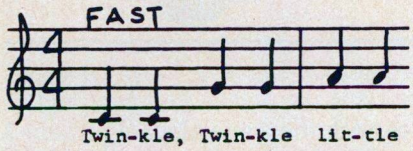
Let's turn to rhythm. Any song can be played fast or slowly. Unlike pitch, the values for duration can change based on the tempo.

PITCH AND RHYTHM ON THE APPLE

Example 3.



The value of duration for each of the first six notes might be 228.



Same song. Same notes. *Faster* tempo. The value for each of the first six notes might now be 132.

Therefore, tempo has an effect on our note values. Tempo is the number of foot taps (beats) per minute. Your music might have something at the top like N = T where N is the note that gets the beat (♪ ♩ 𝅗𝅥) and T is the tempo (88, 112, 124, etc.). If you see ♩ = 112 you know that the quarter note gets the beat and the tempo is 112. If a figure like ♩ = 112 is not given, you will still need to determine the unit of beat and the tempo.

To find the unit of beat, locate the *time signature* at the beginning of the song.

Example 4.

2 3 4 5 / 4 4 4 4 C = ♩

2 3 4 / 2 2 2 ¢ = 𝅗𝅥

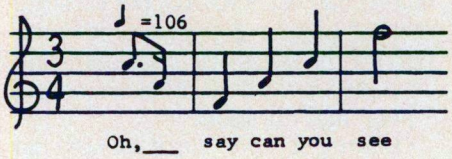
3 6 9 12 / 8 8 8 8 = ♩ or ♪.

To find the tempo, hum the song as you tap your foot. Keep track of the taps for one minute (or 20 seconds x 3). The total number of taps for one minute will be the tempo.

Let's look at Chart 2. It contains the tempo on the side and the notes at the top. Find the tempo and look across the column. These numbers are the note values available at that tempo. At the top of the chart, be sure to select the column which deals with the appropriate time signature.

To see if you understand the duration chart, try finding the values for these notes.

Example 5.



At tempo ♩ = 106 the unit of beat is the ♩ and the duration values are ♪. = 162, ♪ = 54, ♩ = 216, ♩ = 216, ♩ = 216, 𝅗𝅥 = ?*/&! Easy! Notice, however, that no value is available for the half note. That's why I raised the flag. How can I sustain the tone for a longer period of time? I await the next issue of Call -A.P.P.L.E.

Actually, there are two ways to solve such a problem for now. You can change the half note to a quarter note and a quarter rest. Our *minds* will pretty much fill in that rest with sound. You could fill in this gap with a fancy trumpet part.

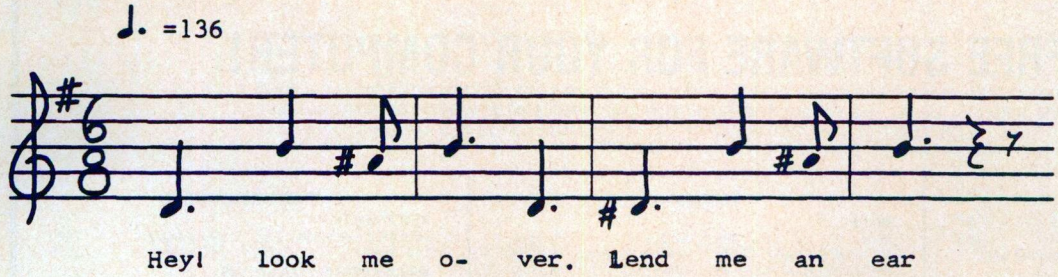
Let's now combine the elements of pitch and duration. When we build a DATA statement for the following song, we must make sure we list the pitch value first, then the rhythm value.

CHART 2

𝅗𝅥	A	♪		♩			𝅗𝅥		𝅗𝅥.	o			
♪	B			𝅘𝅥𝅯			♪		♪.	♩	♩.		♩.
♩	C	𝅘𝅥𝅯	3	♪	3	♪.	♩	3	♩.	𝅗𝅥	♩.	o	o.
	88	63	84	126	168	189	252						
	94	60	80	120	160	180	240						
	100	57	76	114	152	171	228						
T	106	54	72	108	144	162	216						
E	112	51	68	102	136	153	204						
M	118	48	64	96	128	144	192						
P	124	45	60	90	120	135	180	240					
O	130	42	56	84	112	126	168	224	252				
	136	39	52	78	104	117	156	208	234				
	142	36	48	72	96	108	144	192	216				
	148	33	44	66	88	99	132	176	198				
	154	30	40	60	80	90	120	160	180	240			

Based on the "time signature"...
A = half note receives the beat
B = eighth note receives the beat
C = quarter note (or doted quarter) receives the beat

Example 6.



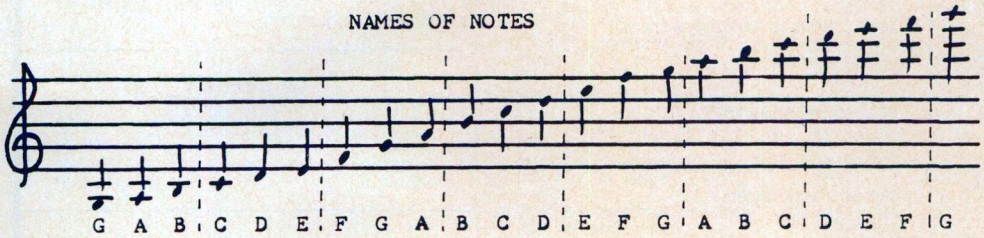
Line #50 DATA 172, 234, 102, 156
108, 78, 102, 234,
172, 234, 162, 234,
102, 156, 108, 78,
102, 234, 0, 234

So in review, these are the procedures:

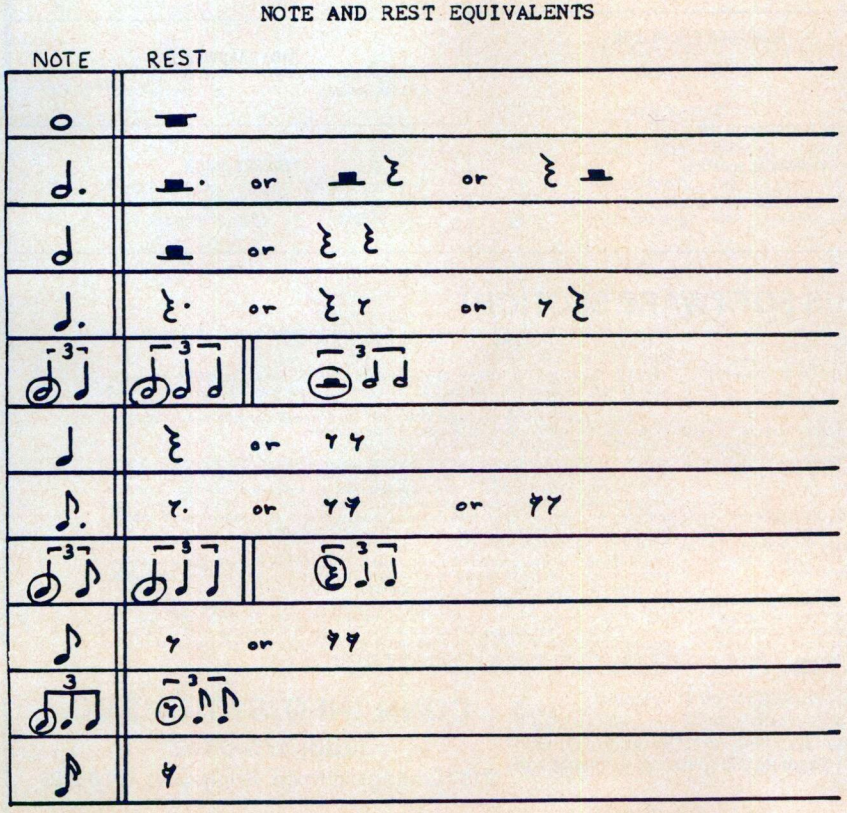
1. Check the key signature!
2. Find the pitch value on Chart 1.
3. Check the tempo.
4. Find which note gets the beat. Chart 2.
5. Find the duration value on Chart 2.
6. Plug into DATA statement PITCH,DURATION,PITCH, DURATION, etc.
7. Happy arranging!

I hope this discussion has been of some help. You may wish to explore slowing down at the end of a piece (ritard) by gradually increasing the note values. Speed up by shortening values. You can avoid long notes and rests by filling in with notes of your own chosing. It will keep your selections more interesting. I prefer fairly fast tempos or songs with shorter note values to keep the interest of the listener at its best. Any other problems, call your old piano teacher. I think we all had one some time or another.

Again, thanks for sharing those articles with me. Keep them coming!



See page 86 for program listing.



HOLD THE PRESS:

Boston in Brief

Val J. Golding

AppleFest — May 14-15-16. . . crowds somewhat less than anticipated. . . perhaps 20,000 plus, but still and all a pleasant, reasonably well managed show, vastly improved over 1981 with 14 aisles of well over 200 exhibitors, a far cry over last year's scant four or so aisles.

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A CALL —A.P.P.L.E. TUTORIAL:

"Let's RESUME At Your Place"

Don Taylor

THE true measure of any successful Applesoft application program may well be the level of "bullet-proof" protection provided in the input routines used to interface with the operator. If you have ever spent weeks developing a clever application, only to have a friend have it on the ropes – in Round 1 – you recognize the level of frustration that is possible when trying to achieve "bullet-proof" input.

Most Applesoft applications gravitate toward the exclusive use of strings to input everything from the user, converting the strings to numerical values and trapping those values when necessary. This method has a couple of disadvantages, too. It can create a large number of strings, and if "garbage collection" isn't performed frequently, your program may seem to die for a period of time while Applesoft performs the collection for you.

Inputting, parsing and concatenating strings is also a relatively time-consuming process, and slows program execution. This normally isn't a problem unless you are doing fancy things on the screen between inputs.

This article will beat the subject of input error handling to death one more time, this time showing how to convince Applesoft that it should handle input errors itself (at least to a degree) with the RESUME command. This technique is especially useful when you want to input information from a "form" you have displayed on your screen. In cases like this you want to detect and handle an input error without disturbing your "form", and without printing input (or error message) trash on it.

Let's take a quick look at what happens when keyboard input errors are handled by Applesoft, and how RESUME operates. In Listing 1, four numbers are input at fixed locations on the display. If you should accidentally input a non-numeric character, you will see the familiar "REENTER" message on your screen, and your input will be moved to the next line of the display. Unfortunately, this will leave "trash" on the screen when you are through with your input (and if you had planned to input information on that line, that's too bad.) Your prompt message has just been overwritten with an error message!

Now add the following lines to the program in Listing 1:

```
100   ONERR GOTO 50000
50000 REM —ERROR HANDLING—
50200 RESUME
```

If you now run the program, you will no longer get the "REENTER" message, but the line dislocation and overwriting still affect any line following an error. The RESUME command causes the Applesoft interpreter to resume at the beginning of the *statement* (not the line) that was being interpreted when the error occurred — in this case, an INPUT statement. Since a carriage return was received at the end of the input string, the re-entry will cause Applesoft to move the INPUT cursor to the next line for the retry.

Notice that if somehow we could convince Applesoft to return to the beginning of the *line* (not just the statement) containing the INPUT command, the HTAB and VTAB commands would automatically relocate the INPUT cursor at the proper place on the screen, no matter how many bogus inputs were attempted!

To see how this can be done, first take a look at Figure 1, which depicts the overall structure of a multiple-statement Applesoft line in hexadecimal format. The first two bytes contain the memory address of the beginning of the next program line, and the next two bytes contain the number of the current program line. Following these two bytes are the Applesoft command token, parameters required for the command, and an end of statement marker ($3A hex). The token for the next statement directly follows the marker, followed by its parameters, and so on until the end of the line marker (00) is reached. [You can see, too, that using multiple-statement lines is a little more memory efficient; only one extra byte is required to add a statement, while five are needed for a new line.]

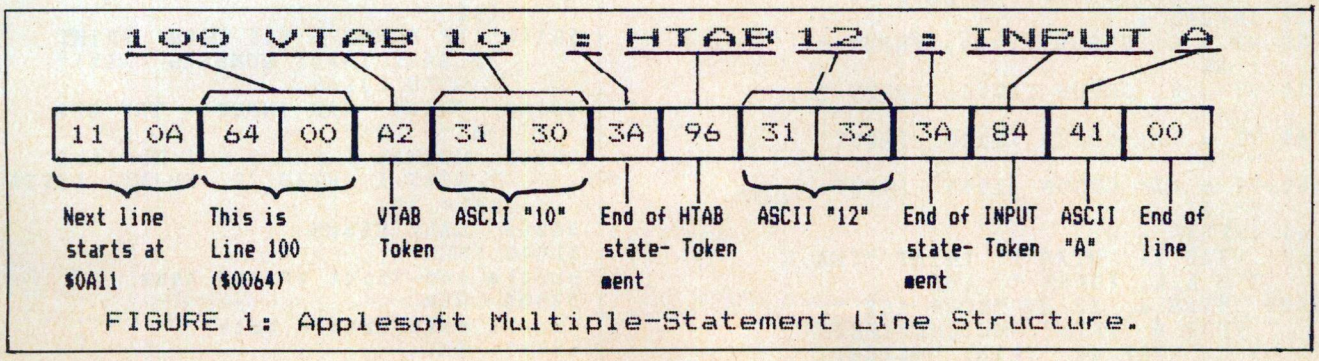


FIGURE 1: Applesoft Multiple-Statement Line Structure.

"LET'S RESUME AT YOUR PLACE"

Now look at Figure 2, which maps out the four bytes at 218 through 221 ($DA through $DD hex) used by the RESUME routine. The first two bytes represent the line number of the line currently being interpreted (and in which any error will be found), while the second pair of bytes contain the memory address (-1) of where the interpreter will resume its interpretation if a RESUME command is encountered. In the case of our INPUT example above, the RESUME routine will be steered to the memory address (-1) of the INPUT statement within the program line in which the input error occurs. If we could just convince the RESUME routine to start its job at the address of the beginning (-1) of the line instead of the INPUT statement, we'd have the benefit of the HTAB and VTAB (and anything else we'd like) prior to the input, and we'd be home free.

Listing 2 is an assembly source program for a "RESUME MODIFIER" to do just that. This routine has its origin at that old, familiar place: 768 ($300 hex). It reads the line number that would be used by the RESUME routine and copies it to $50 and $51, where it is used by the ROM Applesoft FINDLN routine. The FINDLN routine returns the address of the start of the resume line in $9B and $9C; this address is decremented by one and stored in the resume address locations. The RESUME MODIFIER finishes by jumping directly into the Applesoft ROM RESUME routine.

Listing 3 is an expanded version of our modified Listing 1, demonstrating one use of the RESUME MODIFIER. It includes an error-trapping structure that detects and handles input errors through the use of an input flag (INFLAG). Notice that the RESUME command in Line 50200 of Listing 1 has been replaced with a call to the RESUME MODIFIER routine. When an input error is detected, the erroneous input is left on the screen while an error message is displayed. The message and input are then removed, and the operator is given another chance to enter the data.

With the RESUME MODIFIER loaded at 768, try entering some "trash" with this routine, and you'll find it catches most input errors.

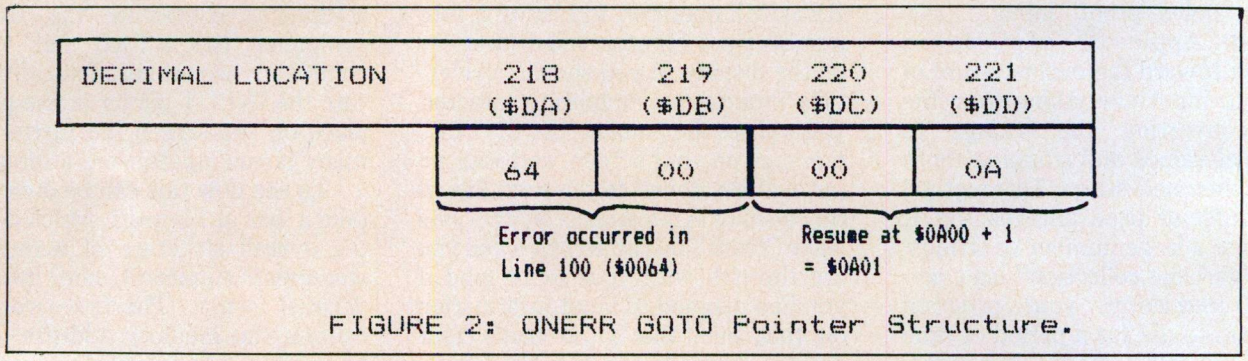


FIGURE 2: ONERR GOTO Pointer Structure.

Listing 3

```
]LIST

10  REM

Enhanced RESUME Demo * Don Taylor


  Call -A.P.P.L.E. : June, 1982

100   ONERR   GOTO 50000
200   PRINT   CHR$ (4)"BLOAD RESUME
      "
500   FOR I = 1 TO 40:BL$ = BL$ +
      " ": NEXT I:BELL =  - 1059
510 RESUM = 768
1000   REM  -- DISPLAY A FORM --
1010   HOME : GOSUB 10000
1100   REM  -- INPUT THE DATA --
1110  INFLAG = 1
1120  VT = 6: GOSUB 11000: INPUT "
      ";A%
1130  VT = 8: GOSUB 11000: INPUT "
      ";H
1140  VT = 10: GOSUB 11000: INPUT
      "";W
1150  VT = 12: GOSUB 11000: INPUT
      "";EI
1160  INFLAG = 0
1200   VTAB 22: HTAB 1: PRINT "THA
      T'S ALL, FOLKS!": END
10000   VTAB 6: PRINT "YOUR AGE:":
       VTAB 8: PRINT "HEIGHT (FEET
      ):": VTAB 10: PRINT "WEIGHT
      (POUNDS):": VTAB 12: PRINT "
      INCOME DESIRED: $": RETURN
11000   VTAB VT: HTAB 19: PRINT  LEFT$
      (BL$,20);: HTAB 19: RETURN
50000   REM  -- ERROR HANDLING --
50010  ERRNO =  PEEK (222)
50020   IF ERRNO < 16 THEN 52000
50030   IF  NOT INFLAG THEN 51000
50100   REM
Handle input errors here
50110   FOR I = 1 TO 5: CALL BELL:
       NEXT I: REM  RING THE BELL!

50120   VTAB 22: HTAB 1: FLASH : REM
       PRINT ERROR MESSAGE
50130   IF ERRNO = 53 THEN  PRINT
      "NUMBER TOO LARGE!": GOTO 50
      160
50140   IF ERRNO = 163 THEN  PRINT
      "PLEASE INPUT NUMBERS ONLY!"
      : GOTO 50160
50150   PRINT "BAD INPUT - TRY AGA
      IN!"
50160   NORMAL : FOR I = 1 TO 1500
      : NEXT I: VTAB 22: PRINT  LEFT$
      (BL$,39)
50200   CALL RESUM
51000   REM
Handle non-input errors here
52000   REM
Handle disk errors here
63999   END
```

Some anomalies in Applesoft will allow you to slip by this type of input trapping by: (1) Entering a single "E" in a string for a real variable; (2) Entering a single period (decimal point) in a string; and (3) Entering a string consisting of only one or more spaces. There's not much we can do about these three little annoyances with this method, as long as we must be able to accept data with a zero value. If only non-zero values for inputs are acceptable, each input statement line can be ended with a check for zero and a GOTO the beginning of the same input line if an input with zero value is detected.

Modifying the RESUME command operation is a little like opening Pandora's box, because it allows many kinds of manipulations to be made that were previously unwieldy or downright impossible. With this bit of insight into the internal workings of Applesoft's RESUME, you'll probably think of many other ways to use the techniques outlined in this article.

There is one assumption we quietly made during the paragraphs above, and in the program listings included in this article: The RESUME MODIFIER routine is called only for inputs expected from the keyboard (and not the disk or some other device).

You can also use the RESUME MODIFIER to augment your other input error trapping techniques. When you do, you'll soon find yourself handling input errors on your Apple with aplomb!

Listing 1

```
]LIST

10  REM

RESUME Demo * Don Taylor

Call -A.P.P.L.E. : June 1982

100  PRINT  CHR$ (4)"BLOAD RESUME
     "
500  FOR I = 1 TO 40:BL$ = BL$ +
     " ": NEXT I:BELL =  - 1059
1000  REM  -- DISPLAY A FORM --
1010  HOME : GOSUB 10000
1100  REM  -- INPUT THE DATA --
1120 VT = 6: GOSUB 11000: INPUT "
     ";A%
1130 VT = 8: GOSUB 11000: INPUT "
     ";H
1140 VT = 10: GOSUB 11000: INPUT
     "";W
1150 VT = 12: GOSUB 11000: INPUT
     "";EI
1200  VTAB 22: HTAB 1: PRINT "THA
     T'S ALL, FOLKS!": END
10000  VTAB 6: PRINT "YOUR AGE:":
      VTAB 8: PRINT "HEIGHT (FEET
     ):": VTAB 10: PRINT "WEIGHT
     (POUNDS):": VTAB 12: PRINT "
     INCOME DESIRED: $": RETURN
11000  VTAB VT: HTAB 19: PRINT  LEFT$
     (BL$,20);: HTAB 19: RETURN
63999  END
```

Listing 2

```
ASM

                 *
                 ********************************
                 *                              *
                 * INPUT ONERR/RESUME Handler   *
                 *                              *
                 *       by Don Taylor          *
                 *                              *
                 * Call -A.P.P.L.E. : June 1982 *
                 *                              *
                 ********************************
                 *
                 * Note: This routine is called as part
                 *   of a BASIC "ONERR" handling routine.
                 *   If the error was an input error
                 *   from the keyboard, this routine
                 *   will cause the BASIC program to
                 *   resume at the beginning of the
                 *    line in which the error occurred.
                 *
                 *
                 LINNUM   EQU  $50
                 LOWTR    EQU  $9B
                 ERRPOS   EQU  $DC
                 ERRLIN   EQU  $DA
                 FNDLIN   EQU  $D61A
                 RESUME   EQU  $F318
                 *
                          ORG  $300
                 *
0300: A5 DA      RESUM    LDA  ERRLIN
0302: 85 50               STA  LINNUM
0304: A5 DB               LDA  ERRLIN+1
0306: 85 51               STA  LINNUM+1
0308: 20 1A D6            JSR  FNDLIN
030B: C6 9B               DEC  LOWTR
030D: A5 9B               LDA  LOWTR
030F: 85 DC               STA  ERRPOS
0311: C9 FF               CMP  #$FF
0313: D0 02               BNE  GEN
0315: C6 9C               DEC  LOWTR+1
0317: A5 9C      GEN      LDA  LOWTR+1
0319: 85 DD               STA  ERRPOS+1
031B: 4C 18 F3            JMP  RESUME

     --End assembly--     30 bytes     Errors: 0
```

IMPROVED ERROR HANDLING

David Short

THE error handling methods in Applesoft are generally quite good for most applications. A typical program can be stopped when an error occurs. The ONERR GOTO procedure will handle most error trapping situations in more sophisticated Applesoft programs.

One situation which is not handled by standard Applesoft procedures is the case of continuing program execution in the statement just after the one in which the error occurred. The RESUME command has the interpreter execution pointer (TXTPTR) set to the statement in which the error occurred. If your error trapping code did not correct the error, you could put the program into an endless loop by careless use of the ONERR GOTO and RESUME commands.

The specific problem I had was to keep a program from stopping if a divide by zero error occurred during the printer output stage in a business performance evaluation and projection program. The general aspects of the problem were that:

- Ratios are used to evaluate performance.
- Zeros will occur in the variables which provide the denominators for the ratios.
- The program already existed with an output format that reflected many hours of programming effort.
- The output format program lines would have had to be completely rewritten if a brute-force test of all possibilities for zero was added.
- Where a divide by zero error occurred, program execution was to continue with the statement immediately after the one with the error.

The program in Listing 1, lines 20 to 60, illustrates the type of program which existed. The addition of lines 10, 1000, and 1010, plus the machine language program in Listing 2, solved the problem. Listing 3 shows the program output.

```
]
] RUN
1    2    3
X    2    3
1    X    3
1    2    X
```

Listing 3

Listing 1

```
]LIST

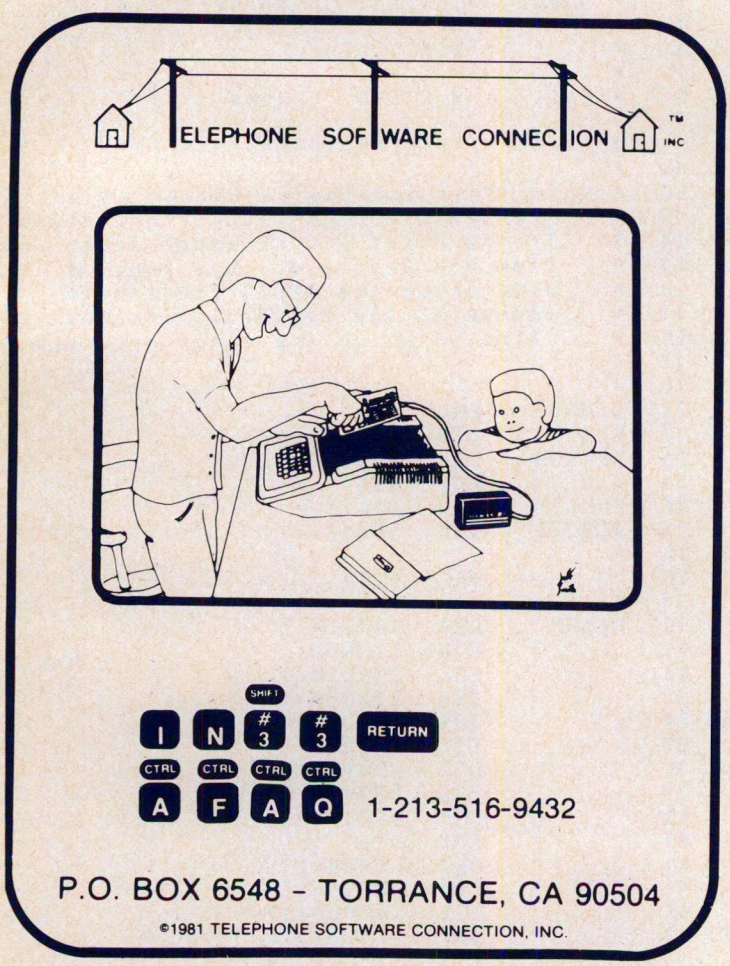
5  REM

ERR HANDLER DEMO

20 A = 1:B = 2:C = 3:D = 0
25  HOME : VTAB 1: PRINT A;: HTAB
     5: PRINT B;: HTAB 10: PRINT
     C
30  VTAB 5: PRINT A / D;: HTAB 5:
      PRINT B;: HTAB 10: PRINT C
40  VTAB 10: PRINT A;: HTAB 5: PRINT
     B / D;: HTAB 10: PRINT C
50  VTAB 15: PRINT A;: HTAB 5: PRINT
     B;: HTAB 10: PRINT C / D
60  END
```

Listing 2

```
10  ONERR  GOTO 1000
15  GOSUB 100
100 HEX$ = "300:68 A8 68 A6 DF 9A
      48 98 48 60 A5 DA 85 75 A5
     DB 85 76 A5 DC 85 B8 A5 DD 8
     5 B9 20 B1 00 20 95 D9 60 N
     D9C6G"
110  FOR I = 1 TO  LEN (HEX$): POKE
     511 + I, ASC ( MID$ (HEX$,I,
     1)) + 128: NEXT : POKE 72,0:
      CALL  - 144: RETURN
1000  IF  PEEK (222) = 133 THEN  CALL
     768: PRINT "X";: CALL 778
1010  PRINT "OTHER ERROR"; PEEK (
     222)
1020  END
```

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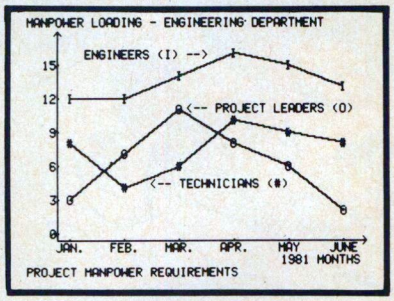

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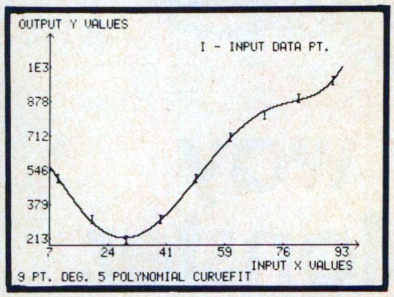

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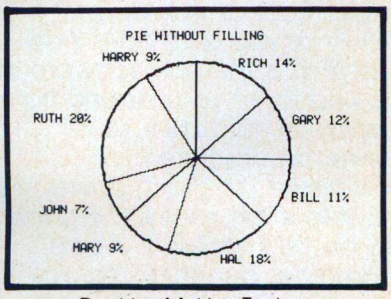

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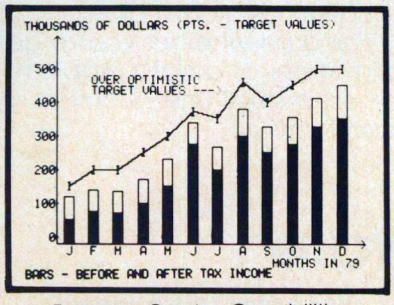

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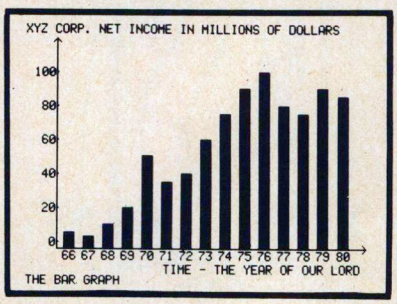

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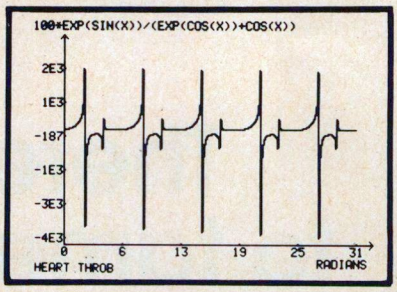

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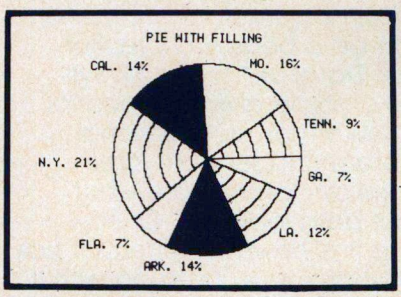

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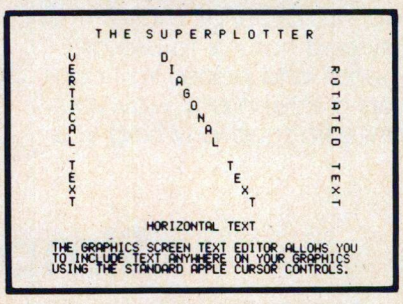

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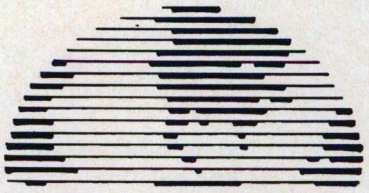
EXPLORING THE WORLD OF APPLE:

Ins and Outs

Tom Little



Part One

THE methods which a computer uses to communicate with the external world are of vital importance to programmers. If it were not for the necessity of communicating with humans, computers could be made much, much smaller and considerably faster. But such communication is necessary, and input and output (I/O) operations generally consume a great deal of the computer's time and the programmer's attention.

The purpose of this article is to describe I/O operations on the Apple computer. It is not a lecture on hardware, but is intended for the programmer. Obviously, hardware will need to be mentioned and (to some degree) explained to discuss I/O, but the discussion will be limited to what the hardware does, not how it works.

This article is intended for intermediate and beginning programmers...

This article is intended for intermediate and beginning programmers, although experienced programmers, it is hoped, may also find some fresh approaches and helpful ideas.

To begin, here are some important terms, with their meanings (as used in this article):

SIGNAL: a signal is an electronic command to some part of the computer hardware. The various parts of a computer communicate by sending each other signals.

LINE: a line is an electrical connection which carries a signal from one part of the hardware to another.

BUS: a bus is a group of lines carrying related signals, usually to a large number of the computer's components.

It is assumed that you are at least passingly familiar with what binary and hexadecimal numbers are. Notice that digital signals are generally either on or off, so one digital signal represents a binary digit, or bit.

The CPU makes all the decisions...

OK, on to the fun part! Figure 1 shows some of the components you'll see if you look inside your Apple, or at the picture on page 89 of the Apple Reference Manual. The CPU* makes all the decisions and does all the arithmetic. The memory "chips" are used for storing data. There are permanent memory chips, which contain programs that your Apple must be able to run when it is first turned on, such as BASIC. There are also temporary memory chips, which you can use for your own programs and data. However, because they are temporary, everything stored in these chips is lost when the power is turned off.

**In Apple's case the CPU is the 6502 microprocessor itself.*

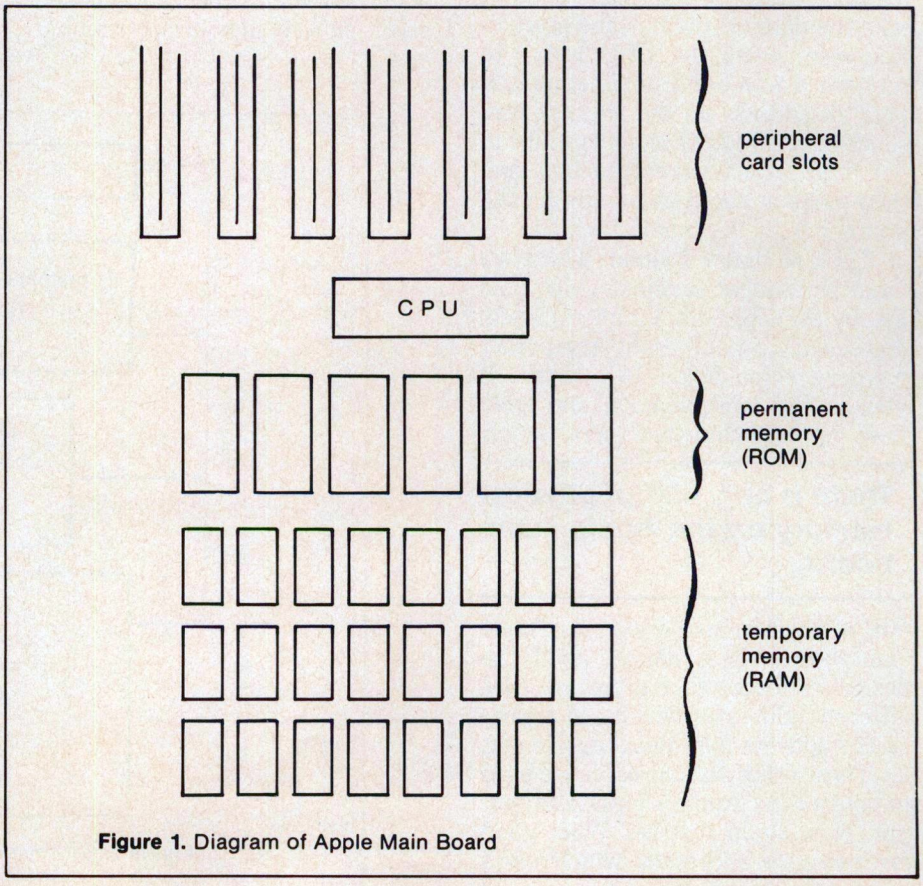


Figure 1. Diagram of Apple Main Board

INS AND OUTS: PART ONE

About this time you should be asking yourself "What is all this talk about memory? Isn't this an I/O article?" The reason for talking about memory is that the Apple uses what is called memory-mapped I/O. It should become clear what this means as you read on.

When the CPU wants to use the data in memory, it must first select which memory location it is interested in. The CPU does this by using the *address bus,* which is a collection of sixteen lines which send signals to the memory chips. These signals tell the chips which memory address the CPU is interested in. Because the address bus is sixteen lines, it can represent any sixteen-digit binary number. There are 65,536 (or 64 "K") such numbers, so there are 64K addresses which can appear on the address bus.

There is also a *data bus,* which consists of eight lines. When the CPU wants to store a number in memory, it places the number (eight bits, right?) on the data bus, places the memory address where the number is to be stored on the address bus, and sends a signal to the memory chips which tells them to take the data off the bus and store it. Likewise, when the CPU wants to retrieve a number from memory, it puts an address on the address bus, sends a signal to the memory chips to put their data on the data bus, and then looks at the data bus to get the number from the memory chips.

Look at figure 1 again. Those six large permanent memory chips hold 2K bytes (eight-bit numbers) each, and each row of eight temporary memory chips holds 16K bytes. If you do the multiplication and addition, you will find that there is only

There is only 60K of physical memory on the Apple main board.

60K of physical memory on the Apple main board. It is almost as if the designers forgot that there are 64K different addresses which can appear on the address bus. But they did not.

Those other 4K addresses are used to control the Apple's input and output. How could that be? What good are memory addresses which don't correspond to any memory?

The explanation lies in the fact that the address bus does not go directly to the memory chips. Instead, it goes through some circuitry which decodes it. This circuitry is responsible for translating the binary address into the proper signals to the proper memory chips. This address circuitry is really quite necessary. If the address is a number (we'll use hexadecimal now) between $0000 and $BFFF, the address circuitry selects the temporary memory chips. If the number on the address bus is between $D000 and $FFFF, the address circuitry selects a permanent memory chip. I like to think of this hardware as a "gnome", a little magical creature that just sits around and does his job, selecting this chip or that, oblivious to the rest of the world but very important.

What does this "address gnome" do if he gets an address between $C000 and $CFFF? As you can see by figure 2, he sends a signal to the I/O circuitry. Aha! No memory chips are selected at all. This is why there are 64K possible addresses and only 60K memory locations. Those other 4K addresses make the address gnome activate the I/O circuitry, instead of selecting a memory chip.

As an analogy, consider the gnomes who work at the U. S. Post office, deciding whose mail goes where and which magazines get mutilated. In Appleville, California there is a street called Memory Lane with, say, 10 houses on it, numbered 1 through 10. When the post office gnomes get a letter addressed to "4 Memory Lane," they deliver it to the proper house. But what do they do when a letter comes addressed to "11 Memory Lane"? There is no such house! Chances are our post office gnomes do something totally different (perhaps they send out for beer and pizza and have a party).

Likewise, the address circuitry also does something "totally different" when it gets a strange address: it activates part of the Apple's built in I/O. For this reason, I resist referring to the addresses $C000 through $CFFF as "I/O locations." They are addresses, yes, but they are no more "locations" than is 11 Memory Lane.

Now come the two big questions for the programmer. How do I put a number on the address bus so that the I/O circuitry will be activated, and how do I select which I/O operation I want done? The second question is the easiest to answer. You

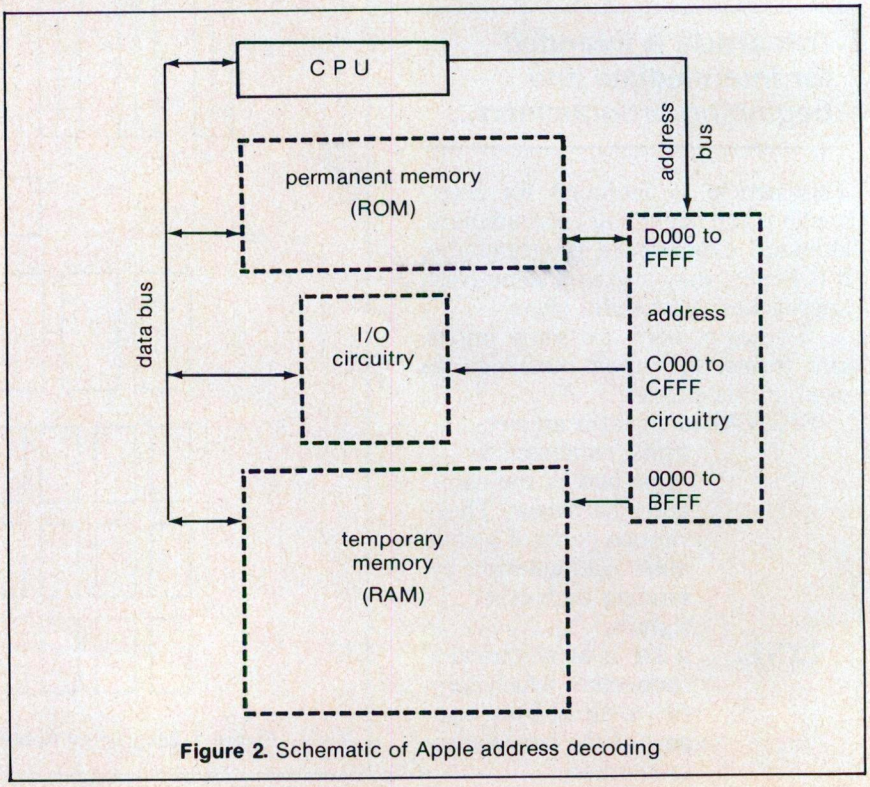


Figure 2. Schematic of Apple address decoding

select a particular operation by using a particular number in the range $C000 to $CFFF. Each number (each "I/O address") specifies a particular I/O operation. See figure 3 for this further "decoding" operation. The specific addresses to use are in the Apple Reference Manual (albeit rather haphazardly) in Tables 22–25 of Appendix B. The addresses in Table 22 ($C000 through $C07F) and their uses will be discussed in some detail later in this article.

But how to get the address on the bus in the first place? If you are programming in assembly language,

...nearly any instruction with an address field will do...

nearly any instruction with an address field will do, such as "BIT $C030" or "LDA $C000." If you are programming in BASIC, you need to use the PEEK or POKE command, and the address must be in decimal, not hex. The decimal equivalents of these addresses ($C000 through $C07F) are given in Tables 1, 5, 9, and 10 in Appendix B of the Reference Manual. You only need to use those strange "negative" addresses if you're programming in Integer Basic. Integer Basic uses the first binary digit of a number to indicate its sign, so all these I/O addresses (which start with "1" in binary) are considered to be negative by Integer Basic. Applesoft is smarter.

These methods for putting numbers on the address bus were all designed for retrieving and storing numbers in *memory*. But since no memory is ever accessed when using the I/O addresses (the gnomes catch it first), the number you "retrieve" will usually be garbage, and the number you "store" is of no importance whatsoever. In my programs, I emphasize this by using statements like DUMMY = PEEK(P1) in BASIC. P1 is a variable which is equal to the number I want to put on the address bus, and DUMMY is a variable that is totally unimportant. BASIC will give you a syntax error if you try to say just PEEK(P1). I use variable names for the addresses for two reasons:

1. It makes the program easier to read and understand, and
2. I can define all the addresses once, at the beginning of the program, so I don't have to remember all those crazy numbers!

Using a variable also makes the program run just a bit faster than using a constant (such as DUMMY = PEEK (49236).

Now let's look at some specific examples.

READING THE KEYBOARD: Normally, a program gets input from the keyboard by using some high-level command such as INPUT in BASIC, or JSR GETLIN in Assembly Language. However, you can get input from the keyboard directly, which is sometimes desirable.

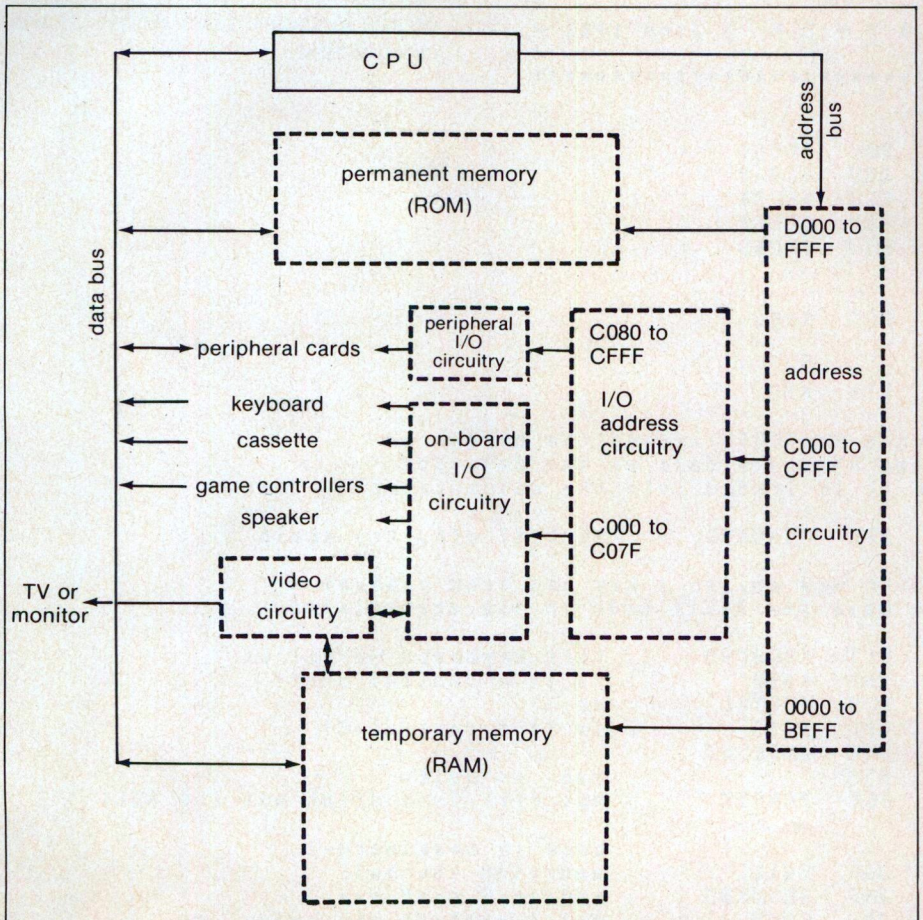


Figure 3. Schematic of Apple address decoding (detailed)

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INS AND OUTS: PART ONE

Refer to program listing 1. This is an Assembly Language program which reads the keyboard directly. Line 22 puts the keyboard control address on the address bus. This causes the address gnomes and the I/O gnomes to allow the keyboard hardware to put some information on the data bus. the keyboard delivers two pieces of information:

1. If bit seven (the "high bit") of the data bus is on, then a key has been pressed.
2. If bit seven is on, then the other seven bits (0 through 6) are the numeric code for the key which was pressed. These codes are given on page 8 of the Apple Reference Manual. Notice that the numeric values given in this table assume that bit seven ("key was pressed") is on.

Line 28 checks to see if a key has been pressed. Notice that bit seven "on" signifies a negative number in Assembly Language.

We get to line 33 after a key has been pressed. Line 33 puts $C010 on the address bus. This causes a signal to be sent to the keyboard, telling it we got the character. This must be done so it will know to start waiting for the next keypress. If we didn't "strobe the keyboard" by using $C010, bit seven from the keyboard would always be "on." What effect would this have? Think about it and then try running the Keyboard Demo program with line 33 removed and see if you were right.

...If we didn't strobe the keyboard, bit 7 would always be on.

Lines 34 through 44 print out the character after we read it from the keyboard. If it is a "control character" (unprintable) then the program prints out its numeric code and beeps. If the character was a "control-C," the program ends. All this is just to prove that we really did read the keyboard, and that we can do whatever we want to with the character after we read it. Notice that reading the keyboard this way displays no flashing cursor, and that keys like backspace, return, and escape do not perform their usual functions but are just "plain old characters." This illustrates the flexibility of reading the keyboard directly.

This program might also have been written in BASIC, using CH=PEEK(KBD) and DUMMY=PEEK (KSTRB), but there is one small problem. BASIC looks at the keyboard itself after executing each instruction, to see if a "control-C" has been typed. If it has, BASIC either stops the program or goes to an ONERR GOTO routine. So you can not read a "control-C" directly off the keyboard from BASIC: it will catch it first.

Listing 1

```
ASM                    ********************************
                 2     *                              *
                 3     *    KEYBOARD INPUT DEMO       *
                 4     *                              *
                 5     *       BY TOM LITTLE          *
                 6     *                              *
                 7     * Call -A.P.P.L.E. : June 1982 *
                 8     *                              *
                       ********************************
                10     *
                11     *
                12     KBD       EQU  $C000
                13     KBDSTRB   EQU  $C010
                14     BELL      EQU  $FF3A
                15     PRBYTE    EQU  $FDDA
                16     COUT      EQU  $FDED
                17     *
                18     *
                19               ORG  $300
                20     *
                21     *
0300: AD 00 C0  22     READKBD   LDA  KBD
                23     *
                24     * reference to $C000 causes the hardware
                25     * to place keyboard data on the data bus
                26     * whence it is loaded into the accumulator
                27     *
0303: 10 FB     28               BPL  READKBD     ; if bit7 off, try again
                29     *
                30     * bit seven was on, so a key has been pressed
                31     * and we have its ASCII code in the accumulator
                32     *
0305: 2C 10 C0  33               BIT  KBDSTRB     ; tell keyboard we got it
0308: C9 A0     34               CMP  #$A0        ; is it a control char?
030A: B0 0E     35               BGE  NOCTRL      ; no.
030C: C9 83     36               CMP  #$83        ; is it a control-C?
030E: D0 01     37               BNE  CODEOUT
0310: 60        38               RTS              ; yes, so quit
0311: 20 DA FD  39     CODEOUT   JSR  PRBYTE      ; not ctrl-C so print out its ASCI
I
                40     *                          ; code in hexadecimal
0314: 20 3A FF  41               JSR  BELL        ; and ring the bell
0317: 4C 00 03  42               JMP  READKBD     ; and read next one
031A: 20 ED FD  43     NOCTRL    JSR  COUT        ; not a control character, so
031D: 4C 00 03  44               JMP  READKBD     ; just print it and get next one

        --End assembly--        32 bytes        Errors: 0
```

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INS AND OUTS: PART ONE

USING THE SPEAKER: Refer to program listing 2. This is an Assembly Language program which produces a tone from the Apple's speaker.

When there is a $C030 on the address bus, the I/O gnomes push the paper cone of the Apple's speaker. If this cone is pushed in and out often enough and fast enough, the vibration produces an audible sound. The Speaker Demo program is just a loop which pushes the speaker, pauses, then pushes it again, 256 times. By changing the length of the PAUSE delay (lines 23–26), you can vary the pitch of the sound produced, and by changing the number of times it goes through the outer loop (line 18), you can vary the duration of the tone.

Listing 2

```
:ASM
                    ********************************
                    *                              *
                    *       SPEAKER DEMO           *
                    *                              *
                    *      BY  TOM LITTLE          *
                    *                              *
                    * Call -A.P.P.L.E. : June 1982 *
                    *                              *
                    ********************************
                    *
                    *
                    SPKR      EQU   $C030
                    *
                    *
                              ORG   $300
                    *
                    *
0300: A2 00                   LDX   #$00
0302: 2C 30 C0      NOISE     BIT   SPKR
                    *
                    * reference to $C030 kicks speaker cone
                    *
0305: A0 00                   LDY   #$00
0307: EA            PAUSE     NOP
0308: EA                      NOP
0309: 88                      DEY
030A: D0 FB                   BNE   PAUSE
030C: CA                      DEX
030D: D0 F3                   BNE   NOISE
030F: 60                      RTS

--End assembly--    16 bytes      Errors: 0
```


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INS AND OUTS: PART ONE

GAME PADDLES: The Apple game paddles are interesting items. Each one contains two separate devices: A dial and a pushbutton. Each device, for each paddle, has its own I/O address.

Each paddle contains two separate devices...

The dials are connected to a "timing circuit" on the Apple's main board. If the timing circuit is "charged up," the amount of time it takes to "discharge" will depend on the position of the dial. Address $C070 "charges up" all the game controller timing circuits. Address $C064 causes the hardware to place turn–on bit seven on the data bus if the circuit for paddle 0 is still charged, or turn it off if the circuit has discharged. A program can reset the timing circuits, then count how long it takes one of them to discharge. The amount of time it takes is proportional to the setting of the paddle dial. This is illustrated by lines 22–38 of program listing 3. The other paddles (there can be more than 2) have other I/O addresses reserved for them.

The pushbutton is read by placing $C061 (for the button on paddle 0) on the address bus. This causes the hardware to turn bit seven of the data bus "on" if the button is being pressed. This is shown in lines 40–45 of program listing 3. The other pushbuttons have their own I/O addresses (refer to appendix B again).

```
:ASM                    ********************************
                        *                              *
Listing 3               *      GAME PADDLE DEMO        *
                        *                              *
                        *       BY  TOM LITTLE         *
                        *                              *
                        * Call -A.P.P.L.E. : June 1982 *
                        *                              *
                        ********************************
                        *
                        *
                        PDL0      EQU  $C064
                        BTN0      EQU  $C061
                        GCSTRB    EQU  $C070
                        COUT      EQU  $FDED
                        PRBYTE    EQU  $FDDA
                        *
                        *
                                  ORG  $300
                        *
                        *
0300: A2 00             GO        LDX  #0          ; start loop with X = 0
0302: 2C 70 C0                    BIT  GCSTRB
                        *
                        * reference to $C070 resets the game controller
                        * timing circuits
                        *
0305: 2C 64 C0          READPDL   BIT  PDL0
                        *
                        * reference to $C064 causes current status
                        * of timing circuit for game controller 0
                        * to appear as bit seven of the data bus
                        *
0308: 10 04                       BPL  GOTIT       ; if bit7 off, time is up
030A: E8                          INX              ; else increment X,
030B: D0 F8                       BNE  READPDL     ; and if it's not gone past $FF
                        *                          ; then check again
030D: CA                          DEX              ; we got here because X ran over
                        *                          ; so decrement it back to $FF
030E: 2C 61 C0          GOTIT     BIT  BTN0
                        *
                        * reference to $C061 causes status of button 0
                        * to appear as bit seven of the data bus
                        *
0311: 10 ED                       BPL  GO          ; bit7 off so start over
0313: 8A                          TXA              ; button pressed so print out
0314: 20 DA FD                    JSR  PRBYTE      ; the result of the paddle read
0317: A9 A0                       LDA  #$A0        ; print a couple
0319: 20 ED FD                    JSR  COUT        ; spaces so it looks
031C: 20 ED FD                    JSR  COUT        ; better,
031F: A2 80                       LDX  #$80
0321: A0 FF                       LDY  #$FF
0323: EA                PAUSE     NOP              ; and pause so there's time
0324: EA                          NOP
0325: EA                          NOP
0326: EA                          NOP
0327: 88                          DEY
0328: D0 F9                       BNE  PAUSE
032A: CA                          DEX
032B: D0 F6                       BNE  PAUSE
032D: 4C 00 03                    JMP  GO          ; and start over
        --End assembly--    48 bytes     Errors: 0
```

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INS AND OUTS: PART ONE

A BASIC program can read the pushbuttons just fine (IF PEEK(B0) > 127) THEN (button was pressed). Notice that in BASIC, bit seven "on" means the number on the data bus is greater than 127, not negative.

In principle, it is possible to read the game paddle dials from BASIC the same way you do from Assembly Language. In practice, however, BASIC is just too slow. By the time it gets around to looking at the state of the timing circuit the first time, it has already discharged, and BASIC has missed all the fun.

CASSETTE I/O: The cassette output works exactly like the speaker output (except it uses a different I/O address, of course). In fact you could change the Speaker Demo program to produce the same sound on a cassette recording, just by changing the I/O address used from $C030 to $C020. Of course the cassette recorder would have to be hooked up and set on "record" when the program was running.

...cassette input works much like the pushbutton...

The cassette input operation works much like the pushbutton inputs. When address $C060 is referenced, the current state of the cassette player is placed on bit seven of the data bus. The state can be either "on" or "off." Usually these states mean nothing by themselves. However, your program can keep track of how often it switches from one state to another, and determine the pitch of the sound on the recording (this is like making sounds on the speaker, only backwards!)

Generally, BASIC will not be fast enough to do any cassette I/O.

ANNUNCIATORS and STROBES: The game controller port, where the game paddles hook into your Apple main board, also has some extra signals available on it. Four of these are "annunciators," which just means they are on/off outputs. There is one I/O address to turn each annunciator on, and another to turn it off. These connections could be used to do all sorts of things, like turning on LEDs, or causing some strange piece of hardware to do something interesting. In fact, the "Game Paddle Printer Driver" in the February 1982 *Call -A.P.P.L.E.* bypasses an interface card altogether and uses Annunciator 0 to send Apple's signal to the printer. However, it appears nobody wants to sell anything to hook up to these "annunciator" outputs, so they mostly just sit there, unused and unwanted. It seems like someone would market a game (at least) that uses these output signals.

There is also a "utility strobe" output, which sends a quick pulse to whatever it's connected to when you reference its I/O address. Like the annunciators, it is hardly ever used.

You might have noticed that there are FOUR paddle inputs and THREE pushbutton inputs, even though Apple sells you only two game controllers. Once again some game I/O inputs are going unused.

The last group of I/O addresses in the "built-in I/O" range ($C000 to $C07F) are called "soft switches." Referencing these addresses sends signals to the video circuitry, which determines what you see on your screen. Referencing these addresses determines whether you see graphics (and what variety of graphics) or text.

The Apple uses what is called a *memory-mapped display,* which means that what you see on the screen depends on what numbers are in certain special memory locations. I will not discuss the details of memory mapping here, but you should know that there are four different memory areas the video circuitry can use to determine what goes on the screen. There are two text pages (which double as Lo-Res graphics pages), and two Hi-Res pages. "Page" just means a range of memory. All four areas are in the Apple's temporary memory - they are not "make-believe memory" like the I/O addresses.

Program Listing number 4 is an Applesoft Program that shows how to control the video circuitry from BASIC. The program draws Hi-Res pictures on Hi-Res pages one and two, then draws a Lo-Res picture, and prints some text on text page one. The program doesn't draw anything on text page two. The best way to understand what these eight "switches" (I/O addresses) do is to run the program. You can activate any of the switches (put the address on the address bus) by typing at the keyboard. Typing "1" or "2" selects the "page," "G" or "T" select graphics or text, "L" or "H" are used for selecting Lo-Res or Hi-Res, and "M" and "N" select either mixed (graphics plus text) or non-mixed (graphics only) display. Use "Q" to quit. Notice when certain switches seem not to work, and try to figure out why.

Text page two is hardly ever used...

Text page two is hardly ever used for text or Lo-Res graphics. Instead, Applesoft programs normally go in this memory area. When you run the Soft-switch Demo program, you will be able to see the program itself (in a somewhat difficult-to-read form) on text page two.

In this article, I have tried to show the way in which a programmer communicates with the Apple's I/O hardware. There is much more to be said (there always is!). For example, reading the keyboard was discussed but what do commands like GET and INPUT really do? And what about output to the screen? How do PRINT and HPLOT and all those other commands do their job? In the program listings, JSR COUT was used to print a character, without explanation. And what about those IN# and PR# commands for peripheral cards? In the second part of this article I will discuss peripherals, DOS, and the standard I/O commands. There will also be a reference chart of *all* the Apple's I/O addresses and what they do.

INS AND OUTS: PART ONE

```
]LIST
10  REM
SOFT-SWITCH DEMO by Tom Little

 Call -A.P.P.L.E. : June 1982

40 GM = 49232: REM
GRAPHICS MODE ($C050)

41 TM = 49233: REM
TEXT MODE ($C051)

42 NM = 49234: REM
NO-MIX MODE ($C052)

43 MX = 49235: REM
MIXED TEXT/GRAPHICS ($C053)

44 P1 = 49236: REM
PAGE 1 ($C054)

45 P2 = 49237: REM
PAGE 2 ($C055)

46 LR = 49238: REM
LO-RES GRAPHICS ($C056)

47 HR = 49239: REM
HI-RES GRAPHICS ($C057)

50  GOSUB 1000: REM
PUT INTERESTING THINGS
ON THE SCREENS
```


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```
100  REM
MAIN CONTROL LOOP

110  GET C$
120  IF C$ = "T" THEN DUMMY =  PEEK
     (TM)
130  IF C$ = "G" THEN DUMMY =  PEEK
     (GM)
140  IF C$ = "1" THEN DUMMY =  PEEK
     (P1)
150  IF C$ = "2" THEN DUMMY =  PEEK
     (P2)
160  IF C$ = "M" THEN DUMMY =  PEEK
     (MX)
170  IF C$ = "N" THEN DUMMY =  PEEK
     (NM)
180  IF C$ = "H" THEN DUMMY =  PEEK
     (HR)
190  IF C$ = "L" THEN DUMMY =  PEEK
     (LR)
200  IF C$ = "Q" THEN  TEXT : HOME
     : END
210  GOTO 100: REM

1000  HGR : HCOLOR= 3
1010  FOR T = 0 TO 2 * 3.1416 STEP
     0.02
1020 X = 140 + 139 *  COS (3 * T)

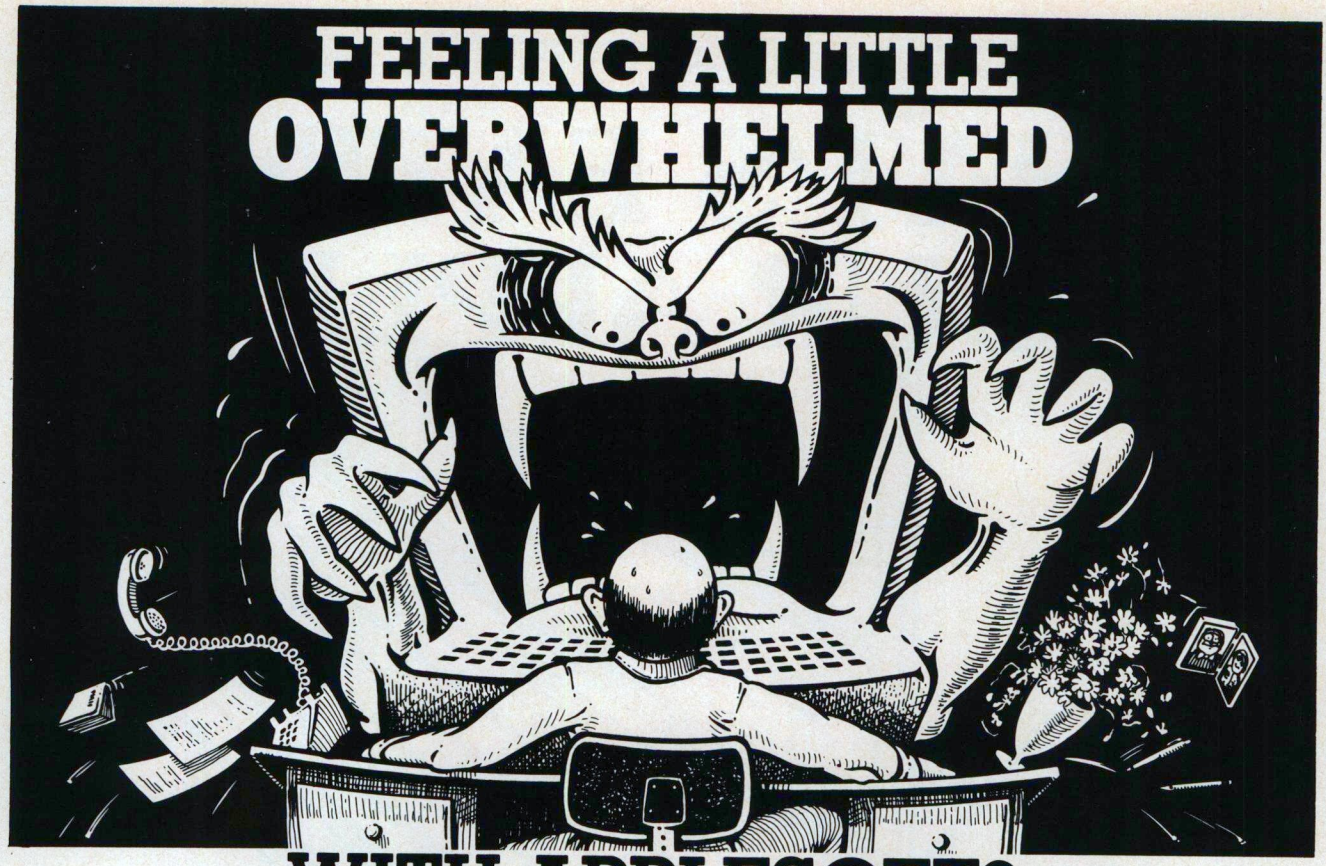
1030 Y = 96 + 95 *  SIN (4 * T)
1040  HPLOT X,Y
1050  NEXT T
2000  HGR2 : HCOLOR= 7
2010  FOR T = 0 TO 2 * 3.1416 STEP
     0.02
2020 X = 140 + 139 *  COS (3 *  SQR
     (T))
2030 Y = 96 + 95 *  COS (3 * T)
2040  HPLOT X,Y
2050  NEXT T
2060 DUMMY =  PEEK (P1)
3000  GR
3010  FOR C = 0 TO 15
3020  COLOR= C
3030  HLIN 0,C * 2 AT C * 2
3040  VLIN 39 - C * 2,39 AT 39 -
     C * 2
3050  NEXT C
3060  HOME : PRINT "( 1/2 G/T M/N
      L/H )"
4000  RETURN
```

```
]LIST

5  INPUT A$: RETURN
100  TEXT : HOME : VTAB 10: PRINT
     "APPLESOFT ERROR"
200  REM
Enter lines 5 and 100 exactly
as shown, type "GOSUB5" from
keyboard, and enter "ERR" at
INPUT prompt. Now delte line 100
by typing "100" and try again

300  REM
SO WHAT DID YOU EXPECT?

Cornelis Bongers:Call -A.P.P.L.E.
```



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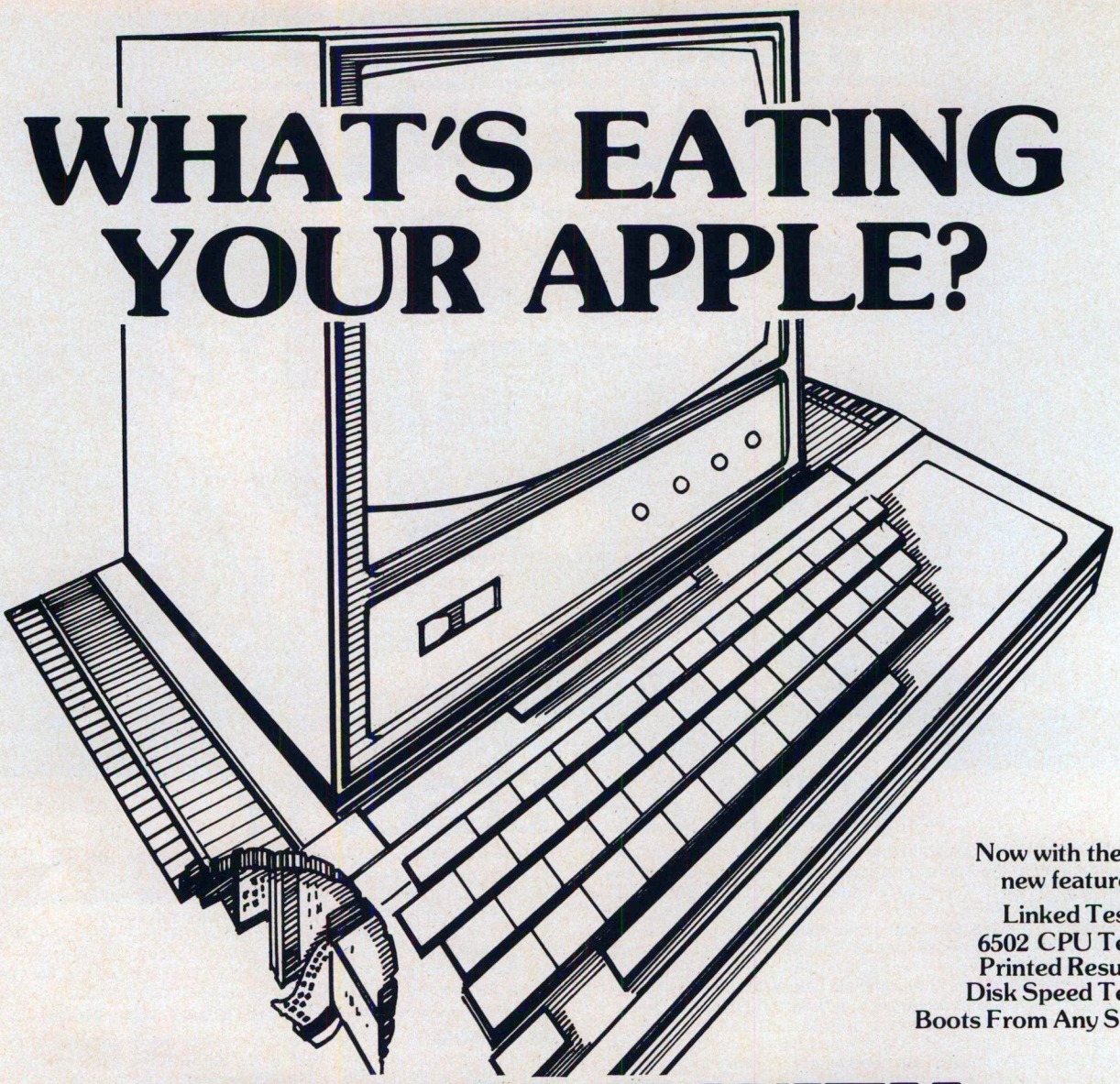

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A CALL —A.P.P.L.E. UTILITY:

DISK VERIFY

Roger Chaffee

DISK VERIFY will call Apple's RWTS subroutine to attempt to read every sector on every track on a diskette, and will list the status code on the screen. You can refer to the description of RWTS in the DOS Manual for a description of the status codes. Basically zero is good and anything else means you've got a problem, probably bad or unreliable sectors on the diskette.

It is possible to fool the operating system so that it will not use certain sectors. DISK VERIFY can change the Volume-Table-of-Contents ("VTOC") on a diskette so that the bad sectors are marked as being in use, so they will not be assigned when new files are saved. This can allow you to use diskettes which would otherwise be wasted.

It is a dangerous technique, however. Diskettes are very inexpensive, compared to the cost of your data and your disk drives. The main use of DISK VERIFY is to detect bad diskettes so you can remove them from service, rather than allowing you to use only the good sectors on them.

A diskette with bad sectors probably *should not be used at all,* except to try to recover the data that is on it. If the bad spot is due to contamination, it could be transferred to the drive and to other diskettes. If it is due to a program disaster, or a reset or power failure during a write operation, you would do best to save or resurrect what you can. Use FID to copy individual files to another disk, use DISK ZAP or a similar program to copy individual sectors, if you need to, and then re-INIT the disk. If it is the "wrong" side of a disk, and the surface is bad enough so that some spots are unusable, maybe it is bad enough to damage your drive. (Probably not, but do you want to take a chance?) Only in the case of physical damage to the disk, which you are sure will not affect the drive, should you attempt to mark bad sectors and use the rest of the disk for normal storage.

At the end of reading, DISK VERIFY will ask if you wish to mark the bad sectors. If you answer "NO," no further action will happen and the program will terminate. If you answer "YES," the track bit-map in the VTOC will be changed so that the bad files are marked as already being used.

One final warning, as if there weren't enough already: there are programs which read a diskette and repair a damaged VTOC, reclaiming sectors which have been accidently removed from the active pool. These programs will not be fooled by the action of DISK VERIFY, and will restore the marked sectors to availability.

BASIC hackers (Is that a self-cancelling term?) may be interested to know that the DISK VERIFY code will run under both Applesoft and Integer BASIC, and will operate with both 13-sector and 16-sector disks.

```
:ASM
                        ********************************
                        *                              *
                        *    Disk Verify Subroutine    *
                        *       by Roger Chaffee       *
                        *                              *
                        * Call -A.P.P.L.E. : June 1982 *
                        *                              *
                        ********************************
                        *
                        *
                        RWTS      EQU   $3D9
                        GETIOB    EQU   $3E3
                        *
                        *
                                  ORG   $300
                        *
                        *
0300: 20 20 03                    JSR   GETIO
0303: 20 D9 03                    JSR   RWTS
0306: B0 06                       BCS   X
0308: A9 00                       LDA   #0
030A: A0 0D                       LDY   #13
030C: 91 00                       STA   (0),Y
030E: 60                  X       RTS
                        *
                                  ORG   $320
0320: 20 E3 03          GETIO     JSR   GETIOB
0323: 84 00                       STY   0
0325: 85 01                       STA   1
0327: 60                          RTS
                        *
                                  ORG   $330
0330: A5 01                       LDA   1
0332: 25 00                       AND   0
0334: 85 00                       STA   0
0336: 60                          RTS
                        *
  --End assembly--      30 bytes        Errors: 0
```

DISK VERIFY

```
]LIST

5  REM

Disk Verify  by Roger Chaffee

Call -A.P.P.L.E. : June 1982

10 BX = 100: DIM BT(BX),BS(BX),MA
     SK(7)
20   CALL  - 936: PRINT "          D
     ISK VERIFY"
25   GOSUB 2000: CALL 800:IOB =  PEEK
     (1): IF IOB > 127 THEN IOB =
     IOB - 256
30 IOB = 256 * IOB +  PEEK (0): POKE
     IOB + 12,1: REM  "READ"
35   POKE IOB + 3,0: POKE IOB + 8,
     0: POKE IOB + 9,2
36 DRIVE = 3 -  PEEK (IOB + 2): REM
      USE EITHER PEEK(IOB+2) OR 3
     -PEEK(IOB+2)
40   PRINT : PRINT "PUT DISK IN SL
     OT "; PEEK (IOB + 1) / 16;",
      DRIVE ";DRIVE
42   PRINT "   AND PRESS (RETURN)"
     ;: INPUT Y$
45   POKE IOB + 2,DRIVE
50   REM

FIGURE MAX SECTOR

55 SX = 15:MEM =  PEEK (978): IF
     MEM > 127 THEN MEM = MEM - 2
     56
60 L1 = 256 * (MEM + 34) + 214:L2
     = 256 * (MEM + 9) + 179
70   IF  PEEK (L2) = 38 THEN SX =
     12: REM  SEE CALL -A.P.P.L.E
     * MAY 1981 P 53
80   IF  PEEK (L2) THEN 100
90   IF  PEEK (L1) = 240 OR  PEEK
     (L1) = 96 THEN SX = 12
100  REM

READ EACH SECTOR

110 BI = 0: CALL  - 936: PRINT "R
     EADING...": PRINT
120  PRINT "VOL   TRACK  SECTOR
          RESULT": PRINT : POKE 34
     ,4
130  FOR TRACK = 0 TO 34: FOR SEC
     T = 0 TO SX
140  GOSUB 1000: PRINT VOL;"
     ";TRACK,SECT,RESULT
150  IF RESULT = 0 THEN 180
160 BI = BI + 1: IF BI > BX THEN
     650
170 BT(BI) = TRACK:BS(BI) = SECT
180  NEXT SECT: NEXT TRACK
200  REM

DONE READING

210  TEXT : IF BI = 0 THEN 610: REM
      QUIT NOW IF NO BAD SECTORS
230  PRINT "--BAD SECTORS--":TRAC
     K =  - 1: FOR I = 1 TO BI
240  IF TRACK = BT(I) THEN 260
250  PRINT : PRINT "TRACK ";BT(I)
     ;"  SECTOR";:TRACK = BT(I)
260  PRINT " ";BS(I);: NEXT I
300  REM

UPDATE THE DIRECTORY

310  TEXT : PRINT : PRINT "MARK B
     AD SECTORS (Y/N)? ";: INPUT
     Y$
320  IF  ASC (Y$) =  ASC ("N") THEN
     640
330  IF  ASC (Y$) -  ASC ("Y") THEN
     300
340 TRACK = 17:SECT = 0: GOSUB 10
     00: REM  READ THE VTOC
350  IF RESULT ) 0 THEN 660
360 VT =  PEEK (IOB + 9): IF VT )
     127 THEN VT = VT - 256
370 VT = 256 * VT +  PEEK (IOB +
     8): IF  PEEK (VT + 53) - SX -
     1 THEN 660
380 J = 256: FOR I = 0 TO 7:J = J
     / 2:MASK(I) = 255 - J: NEXT
     I
390  FOR I = 1 TO BI:J = SX - BS(
     I):BM = VT + 56 + 4 * BT(I) +
     J / 8: IF J > 7 THEN J = J -
     8
400  POKE 0, PEEK (BM): POKE 1,MA
     SK(J): CALL 768 + 48: POKE B
     M, PEEK (0)
410  NEXT I: POKE IOB + 12,2: GOSUB
     1000
420  IF RESULT = 0 THEN 640
430  IF RESULT = 16 THEN 620
440  GOTO 630
600  REM

EXITS

610  PRINT "ALL SECTORS READABLE"
     : END
620  PRINT "*** ERROR *** DISK IS
      WRITE-PROTECTED": END
630  PRINT "*** ERROR *** UNABLE
     TO WRITE": END
640  PRINT "DONE": END
650  PRINT "TOO MANY BAD SECTORS!
     ": END
660  PRINT : PRINT "*** ERROR ***
      CAN'T READ THE VTOC": END
1000  REM

READ/WRITE SUBROUTINE

1010   POKE IOB + 4,TRACK
1020   POKE IOB + 5,SECT
1030   CALL 768
1040 RESULT =  PEEK (IOB + 13)
1050 VOL =  PEEK (IOB + 14)
1060   RETURN
2000   REM

COPY MACH LANG SUBS INTO PAGE 3

2010 HEX$ = "300:20  20  03  20  D9  0
     3  B0  06  A9  00  A0  0D  91  00  60
      N 320:20  E3  03  84  00  85  01
     60  N 330:A5  01  25  00  85  00  6
     0  N D9C6G"
2020   FOR I = 1 TO  LEN (HEX$): POKE
     511 + I,128 +  ASC ( MID$ (H
     EX$,I,1)): NEXT : POKE 72,0:
      CALL  - 144
```

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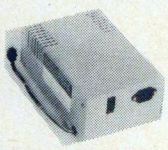

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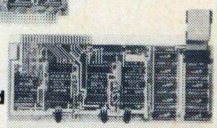

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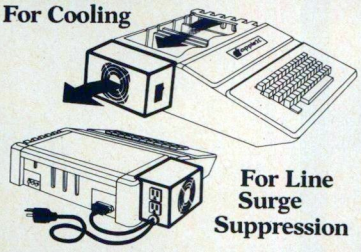

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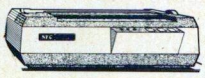

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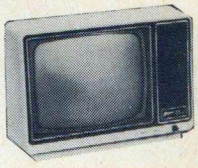

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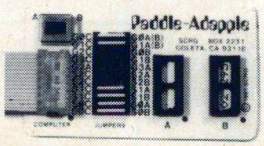

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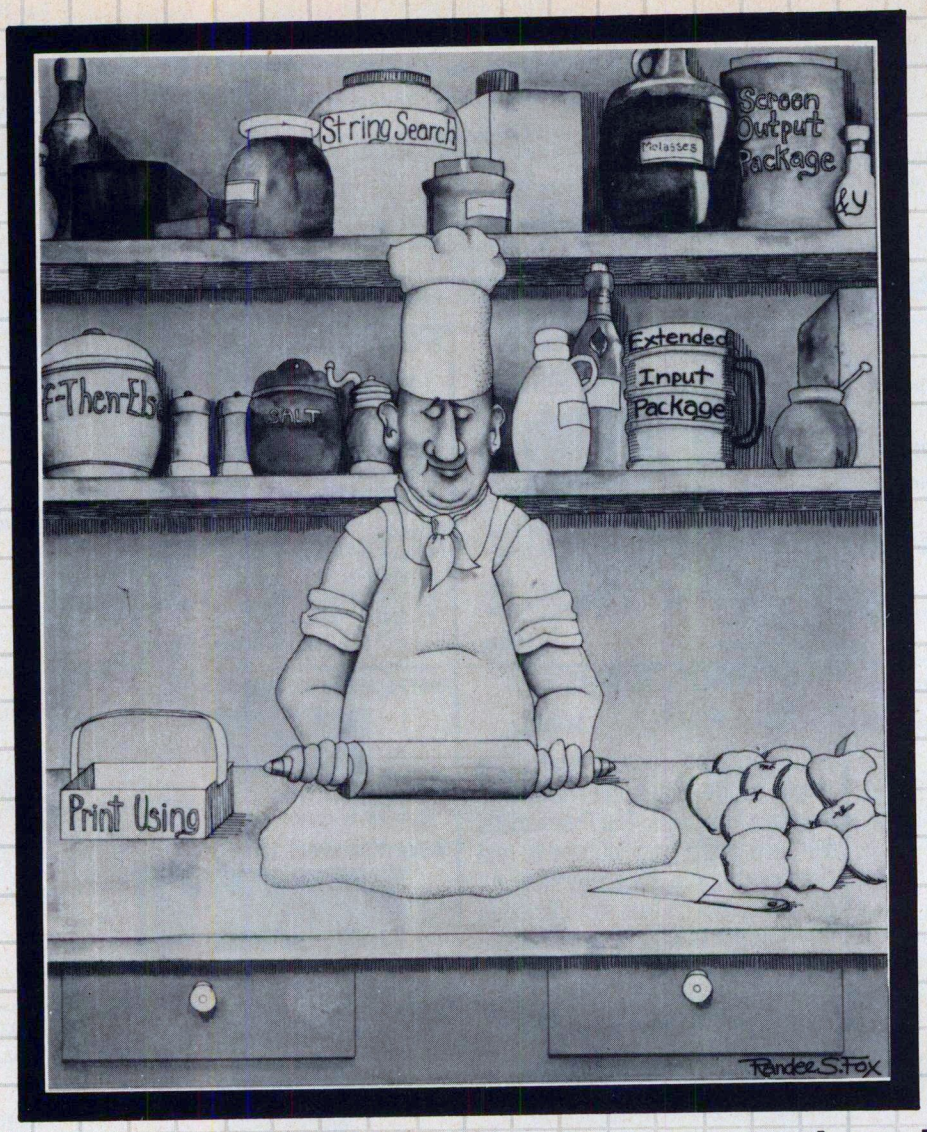

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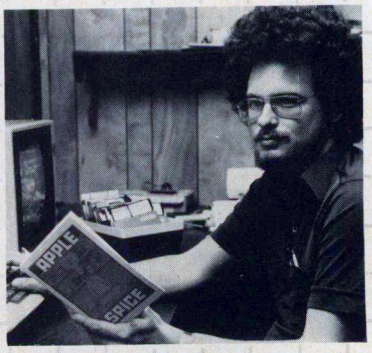

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A CALL —A.P.P.L.E. SOFTWARE REVIEW:

TWO DISK UTILITIES

Val J. Golding/Reviewer

Bag of Tricks
by Don Worth and Pieter Lechner
a copy protected diskette

Quality Software
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Reseda, CA 91335 *$39.95*

QUALITY Software are the folks that brought you *Beneath the Apple DOS,* the first book (read manual) to really explore the intricacies of DOS, which impressed us to the extent that we immediately made it directly available to our members. Our initial reaction is that *Bag of Tricks* follows in the footsteps of *Beneath* and further that the company name truly reflects its output.

Bag of Tricks is a group of four disk utilites accompanied by a comprehensive, 158 page documentation manual. In the order presented in the manual, the four programs are: TRAX, INIT, ZAP, and FIXCAT.

Three of the four programs and the accompanying documentation are far above the skill level expected of a novice. However, FIXCAT, the easiest to use of the four, is worth the price of the package alone. It has the capability of reconstructing a crashed disk from scratch, assuming only that most of the data files remain intact on the object diskette. It is essentially semi-automatic, searching through the disk for each Track/Sector list that remains, and upon finding one, displays the first data sector to the screen and asks the user whether or not it should be recovered. If a YES reply is entered, the user is asked further questions, what to name it, what type of file, etc. FIXCAT then proceeds to the next file. When it has completed its task, it will write a completely new directory and VTOC to the disk. 15 pages of documentation walk the user through this one.

INIT is a program that allows the user to re-format any one or more tracks on a diskette. For example, if the DOS on a diskette has been damaged and the balance of the diskette is OK, the user may opt to re-format only tracks 0, 1 and 2. In the event a data file has been damaged, the track containing a portion of a file may be re-formatted, and if there were any good sectors on the damaged track, they will be retained and written back to the re-formatted track. The 20 page tutorial on INIT also describes how to use the skew factor for better access times, and how to modify the formatting to accomplish it.

TRAX, with its accompanying 16 page tutorial, is a tool to allow examination of a diskette at its most primitive level, i.e., it displays the raw diskette data, address and data fields, checksums, etc., that are coded *in between* sectors and not available to sector read programs such as *Disk Zap,* etc. In addition, the [V]erify command allows you to check for damaged sectors, and under some conditions, in conjunction with this and other supplied utilities, repair them. It also supplies the information needed to analyse a protected diskette for backup purposes. Use of this program requires a good working knowledge of DOS at its lowest levels, although by studious application to the supplied tutorial and *Beneath the Apple DOS,* even the uninitiated can acquire sufficient knowledge to put it to good use.

The best we have saved for last. ZAP is without a doubt, the furthest ranging, most comprehensive disk edit utility we have seen. The title ZAP itself goes back to [now antique] utilities written for IBM and other mainframes. Many of our readers own or are familiar with our own *Disk Zap,* on our Diskpak 6B-16, a disk edit utility that allows the use of RWTS to read, edit and write back to disk a single data sector. Quality's ZAP goes far beyond this, with more than 50 individual commands, along with a macro capability that could be extremely useful under certain conditions. For example, suppose you wished to change three individual bytes in the VTOC on a number of diskettes. You could write and save a macro that would a) read the VTOC into the buffer, b) enter the changes and c) write the changes back to disk, all as one operation, using a single command. 47 pages of the manual are devoted explicitly to ZAP, which, because of its wide range of applications and complex command menu, is not easy to learn. However, we can loosely equate it to a fine word processor, one which handles every possible need of the user. That too is something that is not learned overnight, but when mastered, serves your entire word processing needs for all time. Thus users are warned not to expect a miracle, but to plan on devoting a considerable amount of time to learning and mastering ZAP.

Each of the programs described so far have an entire chapter devoted to their use. Two additional chapters and an appendix complete the *Bag of Tricks* manual, an introduction which describes each of the four programs and their applications, an appendix which discusses common causes of I/O errors, and Chapter 6, entitled *Advanced Tutorials,* a discussion of the included programs and the uses to which they may be put by the intermediate to advanced programmers.

Universal Boot Initializer 4.0
by Art Schumer
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Manvel, ND 58256 *$69.95*

UBI is short for Universal Boot Initializer, a rather unique concept in the utility line. UBI does what is implied by its name, creates a diskette that is bootable on either 3.2 or 3.3 DOS. It differs from published programs that add an extra boot sector to an existing diskette, in that it actually formats a blank diskette and, if the user has a slot 0 RAM card, automatically determines that fact. If so, the user is offered the option of including either or both of FPBASIC or INTBASIC, which is saved as an "S" file, which is accessible by UBI DOS only. In addition, these files effectively use two less sectors for storage, as their track/sector lists are "hidden" in the directory. Best of all, for Language Card users, the time required to load FPBASIC or INTBASIC is reduced from about twenty seconds to less than two, a remarkable improvement.

TWO DISK UTILITIES

Various options and built-in features allow user-selectable names for a HELLO program and an alternate HELLO program in the optional (language card or ROM card) BASIC, and error message programs when one of the two BASICs is not present. Better yet, UBI can stand as a shining example of how utility and application programs should, but seldom are, written to take into account every possible system configuration. When we were running one of our disk controller cards in slot 5, we were frequently exasperated by programs that made no allowance for the fact that a user might not have a controller in slot 6. UBI does, and as well as checking for a ROM card in slot 0, it checks the other slots as well.

One feature just added to UBI version 4.0 is the DOS *Enhancer,* which allows rapid loading (up to 500% faster claimed) of Binary, Integer or Applesoft files.

The package includes two two-sided diskettes, UBI itself, a training disk, a demo disk and a support disk. Back-up diskettes are available for $15, upon completion and return of the included warranty card. Defective disks will be replaced at no charge for thirty days.

Documentation is the one area where otherwise excellent programs often fail, and it is the area that this reviewer observes closely, since much of our published material is written to be understood by the beginner, and the novice user or programmer has the right, we believe, to demand documentation — written to his current level of comprehension.

Clif Howard, the author of UBI's 32 page document has shown well his understanding of the need for clear, concise documentation. Each option which is user-selectable is illustrated with a simulated screen display, an explanation of the function, the allowable parameters, and the possible error messages that can be generated by the feature described. The manual recommends, and we concur, that the first time user take the manual in hand and run the "training diskette" before attempting to use UBI. The training diskette is really an excellent idea, one we have not run into before. It shows the thought and foresight that has gone into the production of UBI as a complete package. Another helpful addition to the documentation is a two page flowchart of UBI operations, followed by seven pages of interesting technical comments and information.

The use of INTBASIC and FPBASIC on UBI and UBI-formatted diskettes is through a license agreement with Apple Computer, Inc., which covers their usage on the UBI-created diskettes. S&H Software also controls sub-licensing, thus for commercial production, arrangements may be made directly with S&H. In researching this review, we found that royalty payments are not predetermined, and the modest charges asked are negotiable, subject to conditions of use.

If you want to be able to INIT diskettes that will boot under virtually any system configuration, for your own use or for commercial applications, then UBI 4.0 is for you.

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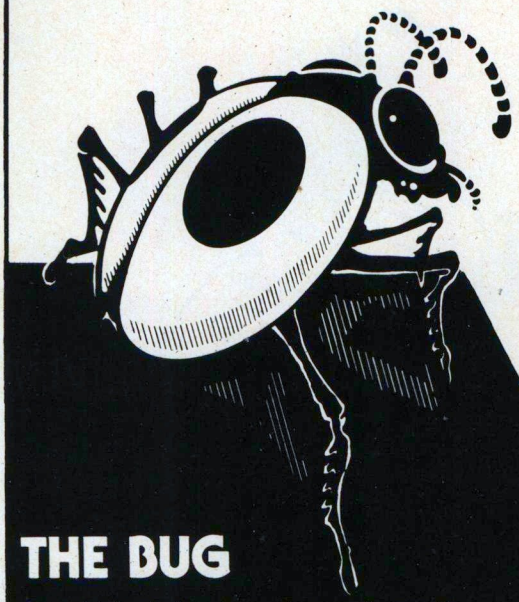

THE BUG

A sophisticated, yet easy to use diagnostic aid for getting "the bugs" out of your assembly language programs.

If you are a novice just getting started with assembly-language programming, you will find The BUG helpful in developing your understanding of how the Apple's 6502 internal processor operates. The many display options of The BUG will permit you to try out your assembly-language programs at the speed that is most comfortable for you. The BUG will also make it easy for you to see the effect of your program on the Apple as it executes.

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Utilities like BUILD USING are usually difficult to use because they must be located in one memory location (usually between DOS and the DOS file buffers); they cannot be used with your favorite editor or other special routines. BUILD USING does not have this limitation, as it can be easily located in many different memory locations: 1) the "normal" between DOS and DOS file buffers, 2) at HIMEM, 3) APPENDED to your Applesoft program, or 4) anywhere else in memory. Appending BUILD USING to your program is as simple as EXECing a TEXT file. BUILD USING uses the "CALL" command thereby leaving the ampersand vector free for your own use.

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A CALL —A.P.P.L.E. UTILITY:

A NEW DOS COMMAND: FILEDUMP

Lee Reynolds/Call —A.P.P.L.E. Staff Writer

HAVE you ever wished that DOS had a command that would allow you to print the contents of a text file? I have. For instance, I write or otherwise acquire an EXEC file, then forget the contents of it: what does it do and how does it do it? Or my program creates a sequential file, a "bug" develops which seems to indicate that one or more records are invalid. In these cases it was necessary to write a program just to dump the contents of the file to the screen (or to a printer.) That can be awfully inconvenient, especially in the second case, because LOADing the File Dump program will destroy the contents of the Symbol Table of my program with the "bug" in it, making checkout harder...

Some of the minicomputers that I work with at my job have File Dumping commands built into their disk operating systems. So I took these as my inspiration, and decided to see if I could modify Apple's DOS to do a similar thing. After much study of the relevant sections of *"Beneath Apple DOS,"* I came up with a very short routine that would do the job.

The routine is so short because it turns out that various parts of DOS already perform most of the functions of my proposed FILEDUMP command. For instance, we can let DOS decode the file name, and the optional slot and drive in the new command:

FILEDUMP filename,S(slot), D(drive)

Then there is logic at hex location $A2A3 which OPENs the file, tests that it is a text file, and gives you an error message if it is not. Another routine, at $A68C will read the file byte by byte. We use the monitor Character Output routine, at $FDF0, to print each byte. Finally, a DOS routine at $A2FC closes the file and frees the buffer connected with it.

The listing of the entire routine is at the bottom of the page.

Where's a good place to put this short routine? *"Beneath Apple DOS"* tells us that there are several short ranges of locations in DOS which are not used. One of these is $BCDF to $BCFF, which is where I decided to place my routine. Here is a hex dump you can use to store the routine there:

BCDF:20 8E FD 20 A3 A2 20 8C A6 F0 05 20 F0 FD D0 F6 20 FC A2 60

Once this has been done, all that remains is notifying DOS of the new command, by replacing an existing one that you never (or hardly ever) use. Since this is the case for the "MAXFILES" command for me, and also since it conveniently has the same number of letters as my "FILEDUMP" command, this is the one I decided to replace. So here is what else needs to be stored while you're in the monitor:

A8E7:46 49 4C 45 44 55 4D D0

This replaces the ASCII characters "MAXFILES" with the characters for "FILEDUMP."

9D48:DE BC

This is the address (minus one) of the new logic to be executed by our command. (There is a table of addresses used by DOS for each command. Normally, locations 9D48 and 9D49 contain the hex values $51 and $A2, which tells DOS that the MAXFILES command is to go to $A252 to do the command. We have just replaced the address for the MAXFILES command with our new command's address.)

And finally:

A933:20 30

This pair of bytes tells DOS that the new command needs a filename as one of its expected parameters, and slot and drive are optional. (There is a table of values for each command, telling DOS what parameters, if any, to expect in each case.)

All of the DOS addresses given in this article are for DOS 3.3 on a 48K system. I believe the same addresses will work on a DOS 3.2 48K system; you'll just have to try it and see. If you have less than 48K, of course, you'll have to subtract the difference between your system size and 48K (=$C000) from all DOS addresses used.

```
:ASM
                        ********************************
                        *                              *
                        *   FILEDUMP  by Lee Reynolds  *
                        *                              *
                        * Call -A.P.P.L.E. : June 1982 *
                        *                              *
                        ********************************
                                ORG   $BCDF      ;Unused area
BCDF: 20 8E FD                  JSR   $FD8E      ;Monitor routine to print C/R
BCE2: 20 A3 A2                  JSR   $A2A3      ;Open file as text
BCE5: 20 8C A6          READ    JSR   $A68C      ;Read a byte from file
BCE8: F0 05                     BEQ   OUT        ;Exit if end of file
BCEA: 20 F0 FD                  JSR   $FDF0      ;Print byte to screen
BCED: D0 F6                     BNE   READ       ;Branch always
BCEF: 20 FC A2          OUT     JSR   $A2FC      ;Close file, de-allocate buffer
BCF2: 60                        RTS              ;Return to BASIC
      --End assembly--          20 bytes         Errors: 0
```

A NEW DOS COMMAND: FILEDUMP

Example: you have a 32K system. 48K minus 32K = 16K = $4000. Therefore, change the addresses to store the above lines from: $BCDF to $7CDF, $A8E7 to $68E7, $9D48 to $5D48, and $A933 to $6933. Also, in line 1 above, these bytes to store must be changed: $A2 to $62, $A6 to $66, and again $A2 to $62. In line 3, the $BC must be changed to $7C.

Since all these modifications have been made to DOS itself, you can now even INITialize a new disk with your modified version of DOS, making available the FILEDUMP command whenever you need it.

Happy File Dumping!

```
]LIST

10  REM

    FILEDUMP COMMAND POKER

Lee Reynolds * Val J Golding

Call -A.P.P.L.E. : June 1982

100 HEX$ = "BCDF:20 8E FD 20 A3 A
      2 20 8C A6 F0 05 20 F0 FD D0
       F6 20 FC A2 60 N A8E7:46 49
       4C 45 44 55 4D D0 N 9D48:DE
       BC N A933:20 30 N D9C6C"
110   FOR I = 1 TO  LEN (HEX$): POKE
      511 + I, ASC ( MID$ (HEX$,I,
      1)) + 128: NEXT : POKE 72,0:
       CALL  - 144: END
```


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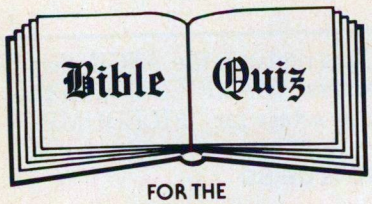

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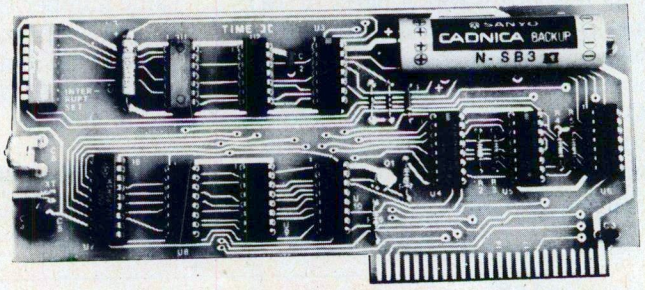

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DUAL BOOT

Bill Bush

DUAL BOOT is a program that converts a 13 sector DOS 3.2 disk so that is may be booted with DOS 3.3 without using the Boot 13 program. The original DOS on the disk is retained after the conversion. DUAL BOOT is an excellent tool for modifying adventure disks and other disks that can not be Muffined to DOS 3.3 disks. The converted disk is still able to be booted by DOS 3.2. DUAL BOOT places 14 sectors on track 0 of the disk. The 14th sector is formatted for DOS 3.3 as track 0, sector 0. This sector is read and executed when the disk is booted with a DOS 3.3 controller card. It contains the machine code that is on the DOS 3.2 disk controller card. Execution of this code then boots the disk in a normal manner. The DOS in RAM is as if a 3.2 boot had occured.

DUAL BOOT is composed of two parts: 1) an Applesoft program and 2) a machine language binary program. This binary program contains a portion of the Muffin program. The Applesoft program loads the binary program and manages the conversion. The DOS in Muffin is used to read, initialize and write to track 0. The machine language program provides the code to write the 14th sector as well as the 3.2 controller card code transformed into the standard 6 bit nibbles of DOS 3.3. The reason that the 14th sector can be placed on the disk is that DOS 3.2 places a gap between each sector that contains about 40 $FF's. By reducing the gap to about 10 FF's, the excess 390 bytes are ample to store a 371 byte DOS 3.3 sector.

The following steps are performed in the conversion process. First, track 0 is read to check for read errors. If an error occurs, the conversion is terminated. Second, the Muffin DOS is modified to include the 14th sector and track 0 is initialized. If it can not be initialized, the DOS is changed back and it is initialized back to 13 sectors. The third step is to write the original track 0 data stored in RAM back to the disk.

The Applesoft program contains three major sections. Lines 100 to 520 interface with the user, initialize the variables and perform the conversion. The DISK][slot and drive are requested and then the disk to convert. Line 300 pokes into the DOS INIT code a value of one to limit the initialization to track 0 only. Line 420 reads track 0 and terminates the conversion if a read error occurs. Lines 440 and 450 GOSUB to the 14 sector initialization routine and check for errors. For error processing, line 470 terminates the conversion on a write protected disk or else line 490 formats track 0 back to 13 sectors. Line 500 stores track 0 data back on the disk by using the subroutine starting at line 610.

The other two major sections of the Applesoft program are subroutines starting at lines 600 and 700. Lines 600 to 690 set up variables and call the RWTS (read write track sector) routine in DOS. Line 730 pokes a JMP into the DOS INIT routine. The JMP is to the code that places the 14th sector on the track. The starting count of the $FF synchronization bytes is reduced to 16 in line 740 and line 750 sets the minimum acceptable number to 5. The DOS INIT is then executed using a command 4 in line 770. DOS is next restored in lines 780 to 800, except the maximum number of tracks to initialize is retained at 1.

The important Applesoft variables are:

RWTS - entry to DOS
LV - exit to 14th sector code
TRMAX - location of number of track to initialize
FFCNT - location of initial count of $FF's
MINFF - location of minimum value of FFCNT
IOB - input/output buffer
EFLAG - error flag from RWTS
ER - error flag

The machine language code contains five parts. DOS3 at $16AF is the code that is attached to the Muffin initialization code to provide the 14th sector. The 6 bit nibbles for this sector are stored from $1700 to $1872. They are the nibbles of a modified 3.2 controller card produced by an auxiliary program. The IOB table is at $1873 and the DOS RWTS entry code is at $1888. The code used from Muffin is from $1900 to $20F7. This code corresponds to normal 3.2.1 DOS from $B800 to $BFF7 in a 48K Apple. To make the machine language binary file, the source program is assembled and its binary saved. Muffin is first BLOADed and then the saved binary is BLOADed at $16AF. The binary file is then produced by BSAVE DUALBOOT, A$16AF,L$A49.

If you are typing the program in from monitor, rather than using an assembler, be sure to enter all data to the right of the HEX pseudo-op, inserting a space between each two characters. The code produced by the assembler lists only the first three bytes of each line of source.

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DUAL BOOT

```
:ASM                    ********************************
                        *                              *
                        *   Dual Boot * by Bill Bush   *
                        *                              *
                        * Call -A.P.P.L.E. : June 1982 *
                        *                              *
                        ********************************
                        *                              *
                        * BSAVE this program with:     *
                        * BSAVE DUALBOOT,A$16AF,L$1E8  *
                        *                              *
                        * This program works from 3.3  *
                        *  environment and requires a  *
                        *  BLOAD of MUFFIN, then a     *
                        *  BLOAD of Dual Boot. Next,   *
                        *  BSAVE the composite with:   *
                        *  BSAVE BOOT,A$16AF,L$A49.    *
                        *                              *
                        ********************************
                        *
                        EFLAG     EQU   $FF
                        *                                DOS     DOS
                        *                MUFFIN         3.2.1   3.2
                        ENTRY     EQU   $1E00        ;$BD00  $BD00
                        FFCNT     EQU   $1FB1        ;$BEB1  $BEAD
                        LV        EQU   $2077        ;$BF77  $BF73
                        FFMIN     EQU   $209A        ;$BF9A  $BF98
                        TRMAX     EQU   $20A5        ;$BFA5  ;$BFA3
                        *
                        BUFFER    EQU   $5000
                        WR        EQU   $C08D
                        RD        EQU   $C08C
                        *
                                  ORG   $16AF
                        *
16AF: A9 FF             DOS3      LDA   #$FF         ;INIT 3.3 SEC
16B1: A4 47                       LDY   $47          ;#$FF COUNT
16B3: 48                D1        PHA
16B4: 68                          PLA                ;BETWEEN
16B5: 48                          PHA
16B6: 68                          PLA                ;SECTORS
16B7: EA                          NOP
16B8: EA                          NOP
16B9: 9D 8D C0                    STA   WR,X         ;WRITE #$FF'S
16BC: 1D 8C C0                    ORA   RD,X         ;TO DISK
16BF: EA                          NOP
16C0: EA                          NOP
16C1: 88                          DEY
16C2: D0 EF                       BNE   D1           ;MORE #$FF'S
16C4: 24 00                       BIT   $00
16C6: 24 00             D2        BIT   $00          ;WRITE SECTOR
16C8: 48                          PHA
16C9: 68                          PLA
16CA: EA                          NOP
16CB: B9 00 17                    LDA   BUFF,Y       ;GET NIBBLES
16CE: 9D 8D C0                    STA   WR,X         ;WRITE NIBBLES
16D1: 1D 8C C0                    ORA   RD,X         ;TO DISK
16D4: EA                          NOP
16D5: C8                          INY
16D6: D0 EE                       BNE   D2
16D8: 24 00                       BIT   $00
16DA: EA                D3        NOP
16DB: EA                          NOP
16DC: C1 00                       CMP   ($00,X)
16DE: B9 00 18                    LDA   BUFF2,Y
16E1: 9D 8D C0                    STA   WR,X
16E4: 1D 8C C0                    ORA   RD,X
16E7: EA                          NOP
16E8: C8                          INY
16E9: C0 73                       CPY   #$73
16EB: 90 ED                       BCC   D3           ;LAST 115
16ED: A9 00                       LDA   #$00
16EF: 48                          PHA
16F0: 68                          PLA
16F1: A4 47                       LDY   $47
16F3: 4C 7B 20                    JMP   LV+4         ;BACK TO DOS 3.2
```

```
                        78
16F6: FF FF FF          79              HEX   FFFFFFFFFF ;10 UNUSED BYTES
16FB: FF FF FF          80              HEX   FFFFFFFFFF
                        81    *
                        82    *
                        83    * These are the nibbles readable
                        84    * by the DOS 3.3 controller card
                        85    *
1700: D5 AA 96          86    BUFF      HEX   D5AA96FFFFAAAAAA
1708: AA FF FF          87              HEX   AAFFFFDEAAEDFFFF
1710: FF FF FF          88              HEX   FFFFFFFFFFFFD5AA
1718: AD 9F B2          89              HEX   AD9FB2ABAFEADF9D
1720: AE B4 BD          90              HEX   AEB4BDA79696AE9D
1728: ED BD E9          91              HEX   EDBDE99DAB9AD9FC
1730: BB B2 F4          92              HEX   BBB2F4FDA7B3ADED
1738: B5 E9 9E          93              HEX   B5E99E96DFE6ABB5
1740: CF DB D6          94              HEX   CFDBD6A7CDAEBDFA
1748: EC AF F3          95              HEX   ECAFF3CDBDD9D9FE
1750: AD AE AD          96              HEX   ADAEADFADFD6EECD
1758: 9F AB EE          97              HEX   9FABEEEE9EBAACB6
1760: CB BC 9D          98              HEX   CBBC9DFAFADEDC9A
1768: DA B7 B4          99              HEX   DAB7B4B4FDDBE59A
1770: B7 BC 9F         100              HEX   B7BC9FF796969696
1778: 96 96 96         101              HEX   9696969696969696
1780: 96 B6 DF         102              HEX   96B6DFECEC9ADCDE
1788: 96 FA B2         103              HEX   96FAB2ABEBCBA7DF
1790: D6 D6 DF         104              HEX   D6D6DFE6E6D7EBAB
1798: DB 9D EC         105              HEX   DB9DEC9FF297F39F
17A0: E7 BF B2         106              HEX   E7BFB29EABA6ABB4
17A8: 9D DD 9A         107              HEX   9DDD9AF5AFB4DAD6
17B0: E6 D7 DF         108              HEX   E6D7DFDAE6D7DFDF
17B8: EB A6 D3         109              HEX   EBA6D3BCA7FCF3E6
17C0: 96 AB DB         110              HEX   96ABDBA6E6E6DAE7
17C8: A7 B7 B7         111              HEX   A7B7B7969F9DEAAE
17D0: B7 F3 FA         112              HEX   B7F3FAE9DE97ABB6
17D8: AE B7 F3         113              HEX   AEB7F3FAAEBDCFA7
17E0: 9F BA AE         114              HEX   9FBAAEB7F3FAAED3
17E8: B5 FE A7         115              HEX   B5FEA7EBB7DCF9BC
17F0: FB F2 9A         116              HEX   FBF29ACFDFD7E7DC
17F8: AE B7 F3         117              HEX   AEB7F3FAF3E7EBD6
                       118    *
1800: AE B7 F3         119    BUFF2     HEX   AEB7F3FAF69FEABB
1808: B3 EE FB         120              HEX   B3EEFBFEFBCB9B9B
1810: A6 B2 A6         121              HEX   A6B2A6EBD6AEB7F3
1818: FA DF BB         122              HEX   FADFBB9AE7DDEA9D
1820: DD 9A F5         123              HEX   DD9AF5B3BFEBD6AE
1828: B7 F3 FA         124              HEX   B7F3FADFBB9AE7DD
1830: E7 EA FB         125              HEX   E7EAFB9FB3B9AEB7
1838: F3 FA DF         126              HEX   F3FADFBB9AF5BCFB
1840: EF 9A DF         127              HEX   EF9ADFEBEB9AB4CE
1848: FC F2 B6         128              HEX   FCF2B6CEE5DDD7EB
1850: DA DC AD         129              HEX   DADCAD96969BB2E7
1858: EA FB A7         130              HEX   EAFBA79AF3F7AFA7
1860: FB FE 9B         131              HEX   FBFE9B9DF296F3F3
1868: BD AD BD         132              HEX   BDADBDF3BABABBE5
1870: DE AA EB         133              HEX   DEAAEB
                       134    *
                       135    * End of data nibbles
                       136    *
                       137    *
                       138    * IOB Table
                       139    *
1873: 01               140    IOB       HEX   01
1874: 60               141    SLT       HEX   60
1875: 01               142    DR        HEX   01
1876: 00               143    VOL       HEX   00
1877: 00               144    TR        HEX   00
1878: 00               145    SEC       HEX   00
1879: 84 18            146              DA    DCTB
187B: 00 50            147    BFF       DA    BUFFER
187D: 00 00            148              HEX   0000
187F: 00               149    CM        HEX   00
1880: 00               150    DOSERR    HEX   00
1881: 00               151    LSTVOL    HEX   00
1882: 60               152    LSTSL     HEX   60
1883: 01               153    LSTDR     HEX   01
1884: 00 01 EF         154    DCTB      HEX   0001EFD8
                       155    *
1888: A9 18            156    RWTS      LDA   #>IOB       ;CALL 6280
188A: A0 73            157              LDY   #<IOB
```

Be sure to enter all hex data.

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DUAL BOOT

```
188C: 20 00 1E  158            JSR  ENTRY      ;TO DOS 3.2
188F: 90 05     159            BCC  J1         ;TEST FOR NO ERROR
1891: AD 7F 18  160            LDA  CM
1894: 85 FF     161            STA  $FF
1896: 60        162  J1        RTS
                163  *
                164  * Remember to enter all data to the
                165  * right of the HEX opcode if you
                166  * are entering this from monitor


--End assembly--     488 bytes        Errors: 0
```

```
]LIST

10  REM

   Dual Boot  by Bill Bush

Call -A.P.P.L.E. : June, 1982

100  TEXT : HOME : PRINT "DUAL BO
     OT": VTAB 4: PRINT "BILL BUS
     H     MAY 1981": POKE 34,5
110  PRINT : PRINT "THIS PROGRAM
     WILL MODIFY A 13 SECTOR    D
     ISK SO THAT IT WILL BOOT WIT
     H EITHER A DOS 3.2 OR 3.3 DI
     SK CONTROLLER CARD."
120  PRINT "AFTER THE BOOT THE OR
     IGINAL DOS WILL BE IN MEMORY
     ."
130  IF  PEEK (5807) <  > 169 THEN
      PRINT  CHR$ (4)"BLOAD BOOT"

140 LV = 8311:TRMAX = 8357:FFCNT =
     8113:MINFF = 8346
150 EFLAG = 255: REM
     RWTS WILL PUT COMMAND VALUE
     HERE IF ERROR ENCOUNTERED
160 IOB = 6259:RWTS = 6280
170  VTAB 11: PRINT "WHICH SLOT?
     (RTN TO QUIT)";: GET A$: IF
     A$ =  CHR$ (13) THEN 520
180 SLOT =  VAL (A$): IF SLOT < 1
      OR SLOT > 7 THEN 170
190  PRINT SLOT" "
200  POKE IOB + 1,SLOT * 16
210  PRINT "WHICH DRIVE? (RTN TO
     QUIT)";: GET A$: IF A$ =  CHR$
     (13) THEN 520
220 DRIVE =  VAL (A$): IF DRIVE <
     1 OR DRIVE > 2 THEN 210
230  POKE IOB + 2,DRIVE
300  POKE TRMAX,1: REM
       TRACK LIMIT
400  HTAB 1: VTAB 11: CALL 64578:
      PRINT "PLACE DISK IN DRIVE"
      CHR$ (13)"HIT ANY KEY TO BE
     GIN";: GET A$: PRINT
410 LSTVOL = 0
420 ER = 0: GOSUB 600: IF ER THEN
      PRINT "CAN NOT CONVERT": TEXT
     : END : REM
     READ TRACK 0 AND CHECK FOR
     ERROR
430 LSTVOL =  PEEK (IOB + 14)
440  GOSUB 700: REM
      INIT 14 SECTOR
450  IF  PEEK (EFLAG) THEN 470
460  PRINT "TRACK 0 NOW HAS 14 SE
     CTORS": PRINT "ONE READABLE
     BY DOS 3.3": GOTO 500
470  IF  PEEK (IOB + 13) = 64 THEN
      PRINT  CHR$ (7)"WRITE PROTE
     CTED": GOTO 510
480  PRINT  CHR$ (7)"CAN NOT MAKE
      MODIFICATION": PRINT "DISK
     BEING RESTORED"
490  CALL RWTS: REM    INITIALIZE
      TRACK 0 TO 13 SECTORS
500  POKE IOC + 12,2: GOSUB 610: REM
      WRITE BACK TO TRACK 0
510  PRINT "UPDATE ANOTHER DISK?
     (Y/N) ";: GET A$: IF A$ = "Y
     " THEN  HOME : GOTO 400
520  TEXT : HOME : END
600  POKE IOB + 12,1: REM
      READ COMMAND
610  POKE IOB + 4,0: REM
      TRACK 0
620  POKE IOB + 3,LSTVOL
630  POKE IOB + 8,0: REM
      BUFFER LOW
640  FOR SEC = 0 TO 12: POKE IOB +
     5,SEC: POKE IOB + 9,SEC + 80
     : REM  SECTOR AND BUFFER
650  POKE EFLAG,0: CALL RWTS
660  IF  NOT ( PEEK (EFLAG)) THEN
     690
670 ER = 1: IF  PEEK (IOB + 12) =
     1 THEN  PRINT "READ ERROR IN
      SECTOR ";SEC:SEC = 12: GOTO
     690
680  PRINT "WRITE ERROR IN SECTOR
      ";SEC
690  NEXT SEC: RETURN
700  REM  INIT
710  POKE IOB + 3, PEEK (IOB + 14
     ): REM  VOL READ
720  IF  NOT ( PEEK (LV) = 72 AND
      PEEK (LV + 1) = 104) THEN C
     0 = 1: RETURN
730  POKE LV,76: POKE LV + 1,175:
      POKE LV + 2,22: REM
      JMP DOS3.3 ($16AF)
740  POKE FFCNT,16: REM
      INIT $FF COUNT
750  POKE MINFF,5: REM
      MIMINUN  FF COUNT
760  POKE IOC + 12,4: REM
      INIT COMMAND
770  POKE EFLAG,0: CALL RWTS
780  POKE LV,72: POKE LV + 1,104:
      POKE LV + 2,164: REM
      PHA, PLA, LDY
790  POKE FFCNT,50: REM
      INIT $FF COUNT
800  POKE MINFF,16: REM  MIMINUN
      FF COUNT
810  RETURN
```

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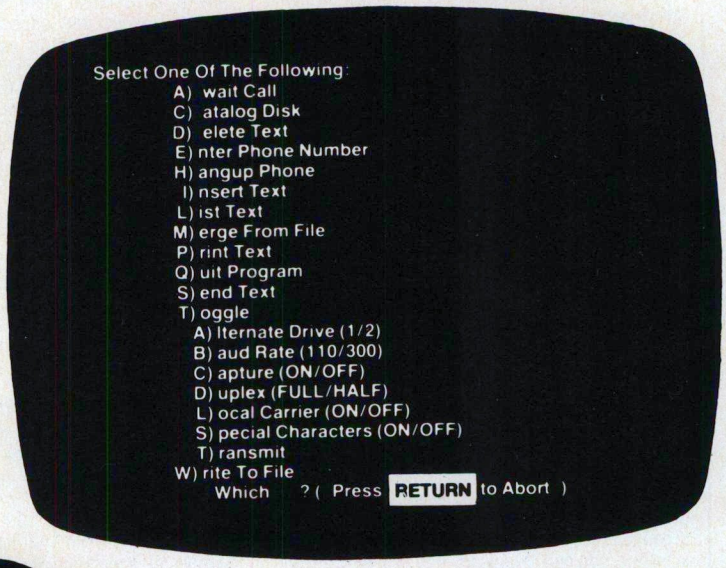

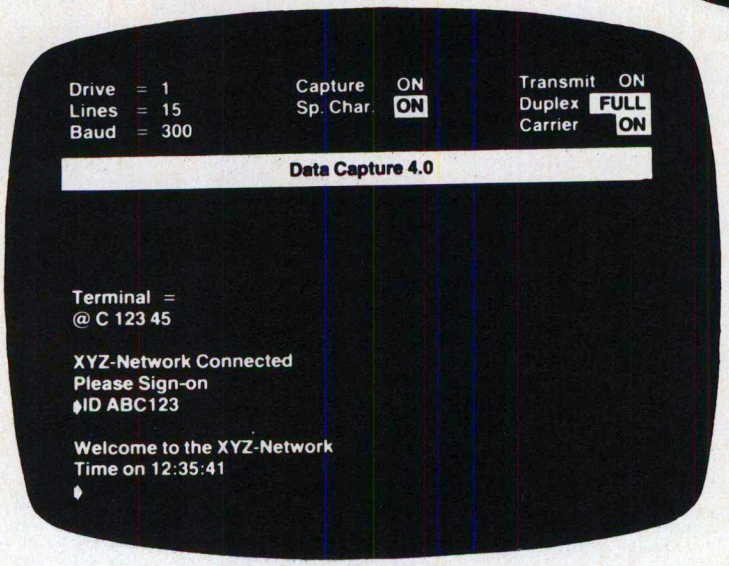

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A CALL —A.P.P.L.E. APPLE-CATION:

CALENDAR DISPLAY ROUTINE

Mike Firth

THIS routine was developed for a program in which I wanted to be able to display any reasonable date by showing the operator a calendar page or pages. It will accurately display dates from 1752, when the United States (or rather Britain and her colonies) adopted the new calendar, to 2099.

The technique used, which requires the least operator action, depends on the fact that the weekday of the first of any year can be calculated by knowing the day of the week of any given year. Line 1952, besides entering and testing the data, sets up January 1, 1979, which was a Sunday, as the first day of the week on a calendar page. Line 1953 permits entry of dates in the 20th century as either 1981 or 81 for the year. Line 1955 moves the starting year back by 28 years per loop until the starting year is less than the entered year. Line 1956 takes care of the fact that the years 1800 and 1900, though divisible by 4, are not leap years under the rules of the Gregorian calendar. (The year 2000 will be a leap year, while 2100 will not, which is why the calendar stops being accurate at 2099—or Feb. 28, 2100 precisely.)

Some peculiarities should be pointed out. I like to enter dates as year, month, day, so that is the way it is done here. If you like a different order, change the message and order of Q(1), Q(2), and Q(3) in line 1952. I like to use R for Thursday, so that is how it appears in the calendar header. For a slight simplicity in the checking routine, you can enter an illegal Feb. 29 date and get away with it. Lastly, this was written for a program that uses one keystroke to get a function, so when an error is encountered, instead of staying in the routine, a brief message is printed and the routine is exited. You may wish to modify this.

Amuse yourself by checking old or future dates or the date of your birthday. As a starting point, consider July 4, 1776; January 1, 2001; and November 13, 1942 (my birthday).

Line 1957 computes the weekday number of the start of the year entered. Again the exceptions of 1800 and 1900 are allowed for.

Lines 1959 to 1962 determine the week day number of the first of the month entered, using the array set up in line 1951. Line 1964 adds the days of the month and line 1965 does a MOD 7 operation on the day of the week. Lines 1966 to 1988 actually control the display of the calendar. The subroutine at 1990 does all the calculations to advance one day at a time through a calendar. The routine at 1997 checks the range of the input.

If you want a couple of trivia questions that are outside the range of this calendar, how about trying this? What date follows each of these dates: Sept. 2, 1752 and March 24, 1700?

Before you get the answer, note a couple of programming ideas. Line 1951 shows one way of getting data into a program without using DATA statements which might conflict when the routine is used in another program. The use of the array Q( ) in line 1952 is common, along with Q and Q$, in my programs. In this particular routine, it permits a date checking routine that can be used elsewhere. In fact, it is used here because I normally use a special entry routine, not INPUT. Also, at one point during development, this routine required that another date be entered, which was eliminated during improvement of the routine.

Answers to the trivia: Sept. 14 followed Sept. 2 in 1752 to correct for the slippage of the calendar with respect to the sun when leap years were not calculated correctly for several centuries. At the same time, the start of the new year was moved from the nominal start of spring to January 1, as it is today. The day after March 24, 1700 was New Year's day, March 25, 1701!

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CALENDAR DISPLAY ROUTINE

```
]LIST

10  REM

 Calendar display subroutine
        by Mike Firth

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Call -A.P.P.L.E. : June, 1982

1950  REM CALENDAR
1951  IF  MID$ (MM$,1,1) <  > "M"
      THEN MM$ = "31,29,31,30,31,
      30,31,31,30,31,30,31": DIM M
      9(12): FOR Q = 1 TO 12:M9(Q)
       =  VAL ( MID$ (MM$,(Q - 1) *
      3 + 1,2)): NEXT :MM$ = "M"
1952 W7 = 1:Y7 = 1979:M7 = 1:D7 =
      1: PRINT "ENTER STARTING": PRINT
      "YEAR, MONTH, DAY": INPUT Q(
      1),Q(2),Q(3): GOSUB 1997:Y8 =
      Q(1):M8 = Q(2):D8 = Q(3)
1953  IF Y8 < 200 THEN Y8 = Y8 +
      1900
1954  IF Y8 = Y7 THEN 1959
1955  IF Y7 > Y8 THEN Y7 = Y7 - 2
      8: GOTO 1955
1956  IF Y7 <  = 1900 THEN W7 = W
      7 + 1: IF Y7 <  = 1800 THEN
      W7 = W7 + 1
1957  FOR Y = Y7 TO Y8 - 1:W7 = W
      7 + 1: IF  INT (Y / 4) * 4 =
      Y AND Y <  > 1900 AND Y <  >
      1800 THEN W7 = W7 + 1
1958  NEXT
1959  IF M8 = 1 THEN 1964
1960  FOR M = 1 TO M8 - 1:W7 = W7
      + M9(M) - 28: IF  INT (Y8 /
      4) * 4 <  > Y8 AND M = 2 THEN
      W7 = W7 - 1
1962  NEXT
1964 W7 = W7 + D8
1965  IF W7 > 7 THEN W7 = W7 - 7:
      GOTO 1965
1966 W9 = W7:D9 = D8:Y9 = Y8:M9 =
      M8
1970  PRINT :D0 = 0
1975  PRINT  TAB( 5);"S   M   T
      W   R   F   S  "M9", "Y9
1980  HTAB (4 * W9)
1981 D9$ =  STR$ (D9): IF  LEN (D
      9$) < 2 THEN  PRINT " ";
1982  PRINT D9;:W9 = W9 + 1: IF W
      9 > 7 THEN W9 = 1: PRINT
1983  GOSUB 1990
1984  IF D9 = 1 THEN  PRINT : PRINT
      : PRINT "HIT RETURN FOR MORE
       OR ESC";: GET Q$: IF Q$ <  >
       CHR$ (13) AND Q$ <  > CHR$
      (27) THEN  PRINT " PLEASE!"B
      X$;: HTAB 1: GOTO 1984
1985  IF Q$ =  CHR$ (27) THEN  PRINT
      : CLEAR : GOTO 1951
1986  IF Q$ =  CHR$ (13) THEN Q$ =
      " ": HTAB 1: PRINT  TAB( 39)
      " ": GOTO 1975
1988  GOTO 1980
1990  REM
1993  IF M9 = 2 THEN  IF Y9 = 190
      0 OR Y9 = 1800 OR YN <  > INT
      (Y9 / 4) * 4 THEN  IF D9 = 2
      8 THEN D9 = 1:M9 = 3:D0 = D0
       + 1: RETURN
1995 D9 = D9 + 1:D0 = D0 + 1: IF
      D9 > M9(M9) THEN M9 = M9 + 1
      :D9 = 1: IF M9 > 12 THEN M9 =
      1:Y9 = Y9 + 1
1996  RETURN
1997  IF Q(1) < 0 OR Q(2) > 12 OR
      Q(2) < 1 OR Q(3) < 1 OR Q(3)
      > 31 THEN  PRINT BX$;BX$;"D
      ATE ERROR ": FOR Q = 1 TO 4:
       PRINT Q(Q)"": NEXT : PRINT
      : PRINT : POP
1998  RETURN
1999  PRINT "SIZE ERROR ": POP : PRINT
      : RETURN
```

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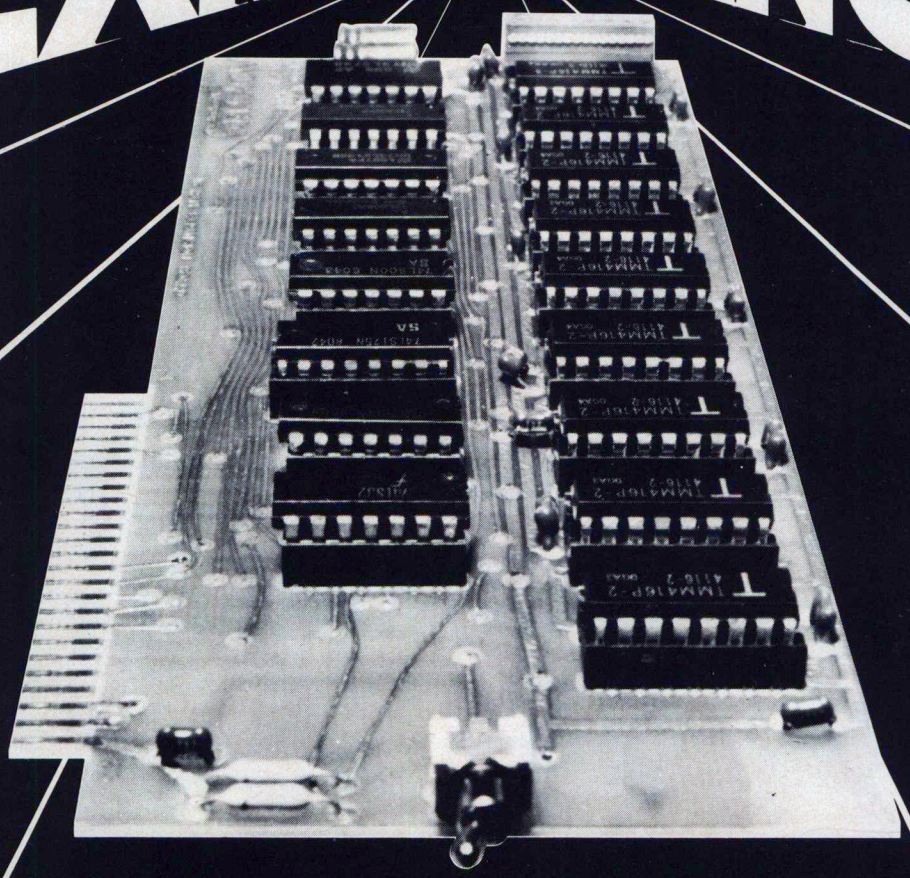

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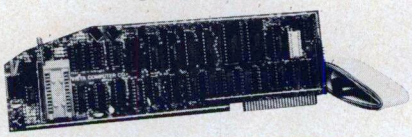

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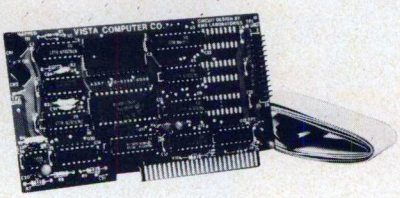

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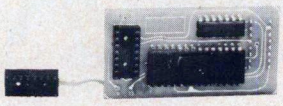

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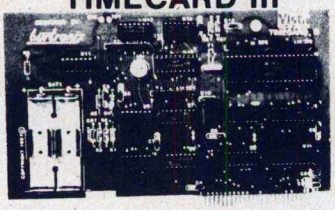

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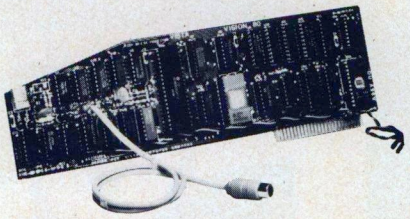

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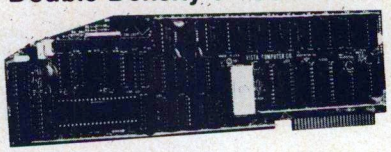

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C.J. Welman

APRIL'S *Call-A.P.P.L.E.* contained an excellent mix of articles. One was "Free Space Patch," a "re-hash" of an earlier article *"Automatic Free Space with Catalog", September 1980* by Mark Pump and Val J. Golding. In order to make it work with Dos 3.3, the original code was broken into two parts, with appropriate interconnecting JSRs and JMPs.

I immediately keyed in the program, saved it and then ran it. How about that? There was a neat "FREE SPACE=" where the "DISK VOLUME" used to reside. Next to it, a number indicated the unused sectors. I cataloged several disks, swapping back and forth between drives 1 and 2.

But...wait a minute! I thought I had 138 sectors unused, now the display indicates 146. Hmmm, perhaps I was remembering a previous diskette's freespace. No, I'm sure I wasn't! Switching to another diskette and back caused the indicated freespace to change by exactly eight sectors, the first time a diskette was accessed. Second and subsequent accesses repeated, but were eight sectors higher or lower. Aha, a BUG!

A quick check revealed no obvious flaw, and the task was left for the morning. Bright and early, I called Val to alert him to the observed glitch. He confirmed that he too had seen the phantom eight sector mystery, but passed it off as his messing with DOS for other purposes.

A couple of days later, I called to report that I had discovered the bug and fixed it. But the exciting news was that I had been successful in compressing the code so that it once again fit into a one patch area! This leads us into the meat of this article.

Just how does one go about compressing code to minimize the space required for a given task? Simple. Back off five steps and learn to get the *big* picture. Programming, particularly in Assembly Language, breeds nearsightedness. Can't see the forest cause all these darn trees are in the way. How true.

An explanation using the "Free Space Patch" program as an example will help:

Start by looking at the code executed *immediately before* the patch. What does it do? In our example, the Volume Number is converted and printed. OK.

What does the patch at the bottom of the page do first?

Whoa! Why do we need the Volume Number printed if we're just going to turn around and overprint it with blanks?

We don't, so let's move the "JSR $BA69" patch from $ADC3 to $ADC0. OK? Sure. Well, if the code at $ADC3 is no longer overwritten, then its replacement code at $BCF0-$BCF2 and $BCF7-$BCF9 isn't needed. Deleting this code means that we don't really need to return from the BASIC subroutine to our program; we can get eliminate the two RTS instructions at $BCF3 and $BCFA. *6 bytes saved.*

As a result of *not* printing the Volume Number, the code at $BA6E to overprint the Volume number with spaces isn't needed either. *3 bytes saved.*

We haven't printed the Volume Number, nor have we overprinted anything with blanks, therefore the cursor must still be standing immediately to the right of the message "FREE SPACE=," right? Right! We don't need to reposition the cursor, so the code at $BA69-$BA6D and $BA71 can be eliminated. *6 bytes saved.*

Wow, we've just barely begun and already $11 bytes have been reclaimed! Consider the fact that much of the code in both the $BA69 and $BCDF sections is required *only* because the two sections are split. Is further compression of code possible?

Well, let's see. If the Volume Number isn't being converted, do we need the code at $ADB9-$ADBF, which simply sets up two temporary registers before the conversion? No, so let's *move* the code at the bottom of the page.

Into this new found area of $ADB9, adding a NOP to the code at $ADB9 to fill the void.

That segment at the bottom now looks like listing 3:

Listing 1

```
BA69: A9 0C      46          LDA  #$0C       ;Position cursor horizontally
BA6B: 85 24      47          STA  $24        ;at column 12 (decimal)
BA6D: 48         48          PHA             ;Save the $0C on the stack
BA6E: 20 48 F9   49          JSR  $F948      ;Print 3 blanks on top of the
BA71: 68         50          PLA             ;Volume no., then retrieve the
BA72: 85 24      51          STA  $24        ;$0C off the top of the stack
                 52  *to reposition the cursor at col. 12
```

Listing 2

```
BA74: A9 00      2           LDA  #$00       ;Zero our temporary registers
BA76: 85 40      3           STA  $40        ;A3L and A3H for use as an
BA78: 85 41      4           STA  $41        ;"number of sectors" counter
```

Listing 3

```
ADB9: EA         8           NOP             ;Filler
ADBA: A9 00      9           LDA  #$00       ;Here's our moved code
ADBC: 85 40      10          STA  $40
ADBE: 85 41      11          STA  $41
ADC0: 20 69 BA   12          JSR  $BA69      ;We hook to the patch from here
ADC3: 20 2F AE   13          JSR  $AE2F      ;Original code back in place now
```

"PATCHING" THE "FREE SPACE PATCH"

Moving the code out of the patch area into "mainline coding" allows us an additional *6 bytes saved.*

Moreover, as Val pointed out, the output routine loads the Accumulator from $E000 and compares with a $4C to determine if the current language is Applesoft or Integer, and selects the proper output routine. In Applesoft, there is a $00 at $E006, thus if we check that location instead, another two bytes may be saved by eliminating the compare instruction. We have now managed to reduce our code by a total of $19 bytes! Will it fit now? Yes! See the resulting patch in Listing 4 below.

That's how it's done. Try looking at some code you've written some time ago, with an eye toward condensing and speeding up the operation. It's amazing just how much you can compress if you just think "BIG" (picture, that is!). Good luck.

Editors note: timing was perfect on Chuck's patch, as it releases the DOS area needed by Lee Reynolds' FILEDUMP, elsewhere in this issue.

```
]LIST

10  REM

    "DOS FREE SPACE PATCH"

  by Mark Pump/Val J Golding

Modified to fit in $BA69-$BA94

       by  C. J. Welman

50  REM

    *** BUG ***


The original had LDA $B3F3,Y
at $BA7D, causing an error on
the first access of a diskette--
the proper code is:
LDA $B3F2,Y, now at $BA6C

100 HEX$ = "BA69: A0 C8 18 B9 F2
     B3 F0 0E 0A 90 FB 48 E6 40 D
     0 02 E6 41 68 18 90 F0 88 D0
      E9 A6 40 A5 41 AC 06 E0 D0
     03 4C 24 ED 4C 18 E5 N D7D2G
     ": GOSUB 120: CALL  - 144
110 HEX$ = "B3AF:BD C5 C3 C1 D0 D
     3 A0 C5 C5 D2 C6 A0 N ADB9:E
     A A9 00 85 40 85 41 20 69 BA
      N D7D2G": GOSUB 120: CALL  -
     144: END
120  FOR I = 1 TO  LEN (HEX$): POKE
     511 + I, ASC ( MID$ (HEX$,I,
     1)) + 128: NEXT : POKE 72,0:
      RETURN
```

Listing 4

```
BA69: A0 C8      17           LDY  #$C8       ;Set up the loop to check the bit
BA6B: 18         18           CLC             ;Maps for all the tracks
BA6C: B9 F2 B3   19           LDA  $B3F2,Y    ;This was the BUG! Was $B3F3,Y by
BA6F: F0 0E      20           BEQ  $BA7F      ;mistake in the article.
BA71: 0A         21           ASL             ;Shift the hi-order bit into carry

BA72: 90 FB      22           BCC  $BA6F      ;Is carry clear?
BA74: 48         23           PHA             ;No, so sector is available
BA75: E6 40      24           INC  $40        ;Increment the totalizer counter
BA77: D0 02      25           BNE  $BA7B      ;Do we need to bump the hi-byte?
BA79: E6 41      26           INC  $41        ;Yes
BA7B: 68         27           PLA
BA7C: 18         28           CLC             ;These two instructions simulate
BA7D: 90 F0      29           BCC  $BA6F      ;the Unconditional Branch Relative

                 30   *instruction not avail in the 6502
BA7F: 88         31           DEY             ;Decrement the Index and go check
BA80: D0 E9      32           BNE  $BA6B      ;All done?
BA82: A6 40      33           LDX  $40        ;Yes, so load the 'X' and 'A' regs

BA84: A5 41      34           LDA  $41        ;and then check to see which BASIC

BA86: AC 06 E0   35           LDY  $E006      ;is active
BA89: D0 03      36           BNE  $BA8E      ;Not Applesoft--GOTO Integer PRDEC

BA8B: 4C 24 ED   37           JMP  $ED24      ;Yes, so call Applesoft to convert

                 38   *and print the number of free
                 39   *sectors. We will return to
                 40   *caller from the BASIC subroutine
BA8E: 4C 1B E5   41           JMP  $E51B      ;Call Integer to do the work and
                 42   *return from there
```

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OPEN LETTER TO COMPUTER WIDOWS

Sabine Kurjo

I have heard from a lot of men that their ladies/wives/girlfriends are jealous of their computer. In the 60's and 70's men spent their nights in computer centers, now the micro computer becomes the rival at home. I am a 36 year old woman and have experienced the addiction which goes with large as well as small machines, and want to offer some observations which I hope will be useful to both male and female readers.

Let us look at the differences between person-to-person communication and person-computer interaction in terms of sending and receiving information.

A computer gives power to the person like any other tool (knife, gun, car). However, computers give power to the *mind,* whereas, so far, tools have extended the power of the *body.*

Computer programmers get the kind of enjoyment out of their activity that you get when you solve crossword puzzles or other intelligence tests. However, the programmer "talks" to *himself,* while the puzzle solver talks to the person who designed the puzzle. The programmer sets a goal and gets there according to the rules he has agreed to by purchasing his machine.

So, what can you, the woman, do while he is busy, excited and frustrated in the attempts to reach his self-defined goals?? You can also set yourself a goal, an activity, a way of spending your time which is meaningful for you.

He does not want to fulfill your expectations and you not his. He therefore prefers to communicate with a machine which does not expect anything from him, does not make any demands. So you can start out by fulfilling for *yourself* what you expect from him. What do you need?? What do you *want??* You want to send information to the world, to somebody, you want to express yourself – just like he... You may want to learn about living the excitement of the uncertainty of people's reactions rather than choose the relative certainty of machines. You may want to learn to become as attentive to others as a computer is to its user: offering undivided capacity to listen, to perceive and to feel. You may want to learn giving up the control of your environment while he is improving his capacity to control machines.

In other words, you have a choice. Instead of expecting *him* to make you happy and be frustrated if he doesn't, you can learn to create happiness by yourself for yourself. That relieves him of a heavy burden and leaves you with the opportunity for a life of more autonomy, self-sufficiency and inner richness.

Power to him from a computer—power to you through your courage and desire to experience life.

The relative predictability of computers makes it safer to communicate with them than with people. It is also safer to talk to oneself through the machine than to someone of the other sex, who might cause feelings of pain, pleasure, separation and closeness. Numbers, sums, reports and analysis give us the illusion of a security which we need as long as we don't trust ourselves and our perceptions enough. It takes courage and the willingness to change our way of being when we start expressing feelings we have never expressed before or welcoming somebody else's feelings.

It is a long process of change to open up to one's inner life of emotions, dreams and aspirations. You may want to start your inner journey while he is communicating with his computer. Your jealousy can become your opportunity.

about Sabine Kurjo...

The author had been a computer programmer for seven years when a car accident prevented her from doing her normal job. Doctors suggested that her pain was psychological. She followed her existing interest in psychology and discovered so much joy and satisfaction from participating in "growth" groups that she started a growth center and organized European conferences on humanistic psychology — aided by an Apple computer.

Humanistic psychology, personal growth and the human potential movement are terms describing the above suggestions for experiences and attitudes. The Association for Humanistic Psychology, AHP, 325 Ninth Street, San Francisco, 94103, will give you information about activities going on in your area.

PERSON	PERSON	COMPUTER
Sending information	uncertain way of receiving	mostly predictable way of receiving
Receiving information	uncertain pleasure possible pain	generally understandable even if not expected
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Control over receiver	difficult to achieve	possible and desirable
Expectations of receiver	unable to meet expectations	challenge and goal to meet expectations

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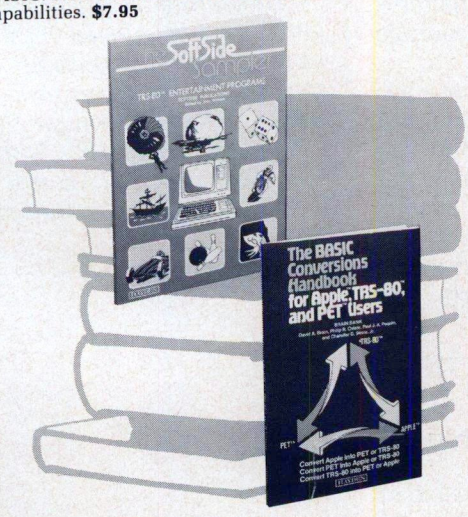

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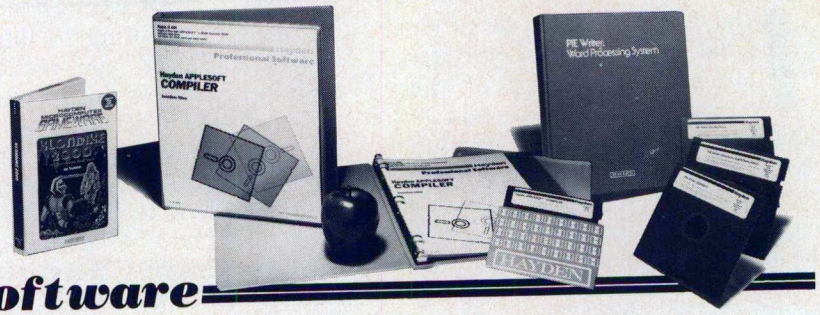

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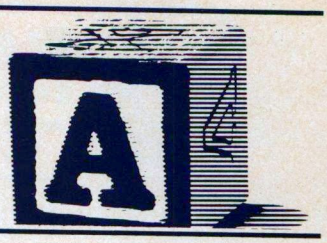

MY printer is one that does not make mailing labels. I have the APPLE SILENTYPE and wished that there was a way to make labels that I could use on envelopes and manuscripts with this printer. Here is the way to do it. This is not as elegant as an "expensive" printer, but it is an easy way, is effective and serves the purpose nicely. Here is how you too can make your own labels.

First write a program that allows the use of any Name, Address and Zipcode. Then save this program and use it whenever needed.

```
10 HOME
20 INPUT "ENTER NAME : ";N$
30 INPUT "ENTER ADDRESS : ";A$
40 INPUT "ENTER CITY : ";C$:INPUT
   "ENTER STATE : ";S$:CS$=C$+","
   +S$
50 INPUT "ENTER ZIPCODE : ";Z$
```

Lines 10 to 50 ask for information, then forms strings with the data entered. These lines enable the user to use the program for any name entered, and to change information at will. If, for example, the label should include an apartment number, just add line 35.

```
35 INPUT "ENTER APARTMENT :";P$
```

Line 40 asks for City, then State. Commas within strings that are not enclosed between quotation marks will cause the message "Extra ignored" to be printed after the ",". The label should have a comma between City and State, so line 40 then concatenates (joins together) the string C$ and S$ with a comma. Note the use of the "+" sign and that the comma is enclosed by quotation marks. Concatenation is a useful way to join strings together to form one string consisting of several smaller strings. In this case, the string CS$ is composed of the two strings C$ and S$.

```
60 INPUT "NUMBER OF LABELS
   DESIRED : ";NL
```

Line 60 can be for any amount, but for practical purposes, I have found that thirty is just about the correct amount to make at one time.

```
70 N=0:D$=CHR$(13)+CHR$
   (4): PRINT D$; "PR#1"
80 PRINT:PRINT N$;:GOSUB 1000
   :; PRINT N$;:GOSUB 2000:PRINT
   N$
90 PRINT A$;:GOSUB 1000:PRINT
   A$;:GOSUB 2000; PRINT A$
100 PRINT CS$;:GOSUB 100:PRINT
   CS$;: GOSUB 2000:PRINT CS$
110 PRINT Z$;:GOSUB 1000:PRINT
   Z$;: GOSUB 2000:PRINT Z$
```

Line 70 initializes the counter, calls DOS and then initializes the printer. If your printer is in a different slot, you will have to adjust appropriately. Lines 80 to 110 print the strings that were entered in the first lines of the program. Pay attention to the use of the commas in these lines, for they prevent a return and allow the strings to be printed on one line across the paper. Lines 1000 and 2000 POKE tab commands into memory location 36 (decimal), that separate the labels across the paper, making it easier to cut apart later. This works for the SILENTYPE, but you will have to individualize for your printer. The first PRINT statement in line 80 is there to separate the labels vertically.

Line 105 may be added if the label requires apartment information to be included. Just use the same format as line 100. If most of your mailing labels should include apartment numbers, then add these lines to your saved program. Or you might prefer to delete these lines if the listing does not require this information. The choice is yours; pick whatever suits your needs best.

```
120 N=N+1
130 IF N=NL THEN PRINT D$;"PR#0":
    END
140 GOTO 80
```

Line 120 adds one to the counter, and line 130 looks to see if the number selected earlier has been printed. If not, line 140 loops back to print an additional label. When the quantity of labels printed is the amount asked for, line 130 shuts the printer off and ends the program.

```
1000 POKE 36,25
1010 RETURN
2000 POKE 36,50
2010 RETURN
```

A POKE into location 36 sets the horizontal position of the cursor, and is used instead of the HTAB command which will not work beyond column 40. Line 1000 sets the next tab to position 25, where the next label is printed, and poke 36,50 prints third horizontal label at position 50. Most names and addresses are less than 25 characters, so these pokes nicely separate the labels.

Save this program with the file name of "MAKE LABEL". When it is run, it will ask you for the information to be printed on the label and then for the number of labels wanted. Remember thatthe computer will print three labels across, so a request of ten will result in thirty labels being printed, about the size of a 8 X 10 sheet of paper.

I print thirty labels at one time for each name that I write to often, and about one hundred with my name. The sheets fit nicely into a manila folder. I then cut out a label, and with a touch of a glue stick, attach one to the envelope for the addressee, and one with my name in the left corner as return address.

Make your own mailing labels. It is much nicer than having to write (or worse yet) type the envelopes. Don't forget, you still have to put a stamp on the envelope before mailing. I still haven't figured out how to get my APPLE to do this task, but maybe someday . . . . .

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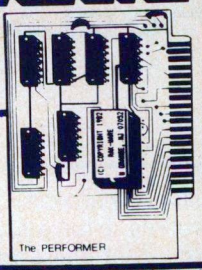

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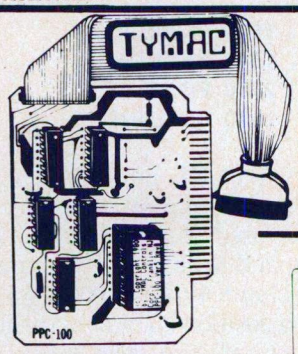

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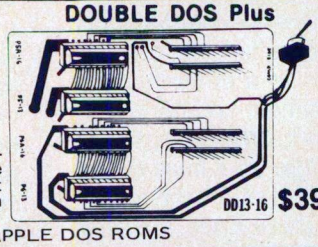

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APPLEMASH:

GETting Straight

Michael Thyng

LAST time I promised you we'd talk about the GET command. I think the GET has been a victim of horrible abuse. I see it misused almost every time I see a programmer's first attempt to have data input into a running program from the keyboard. As always, this column focuses on the aspects of writing programs — correctly — for business.

Before we start, let me emphasize that generally, in a business program, you wouldn't use the GET statement. Yes, I expect cards and letters on that one. But, let's face facts. When you're running a business program and you have to accept data through the keyboard you are typically looking to enter related customer data. Or, you are entering sales figures or invoicing figures or perhaps payroll parameters.

What are they composed of? Special control characters and ESC inputs? NO. They are made up of names, descriptions, and numeric quantities. They are most easily input into your program using the INPUT command.

I always emphasize this one general rule. Use the easiest way of coding the program that you can. There is no place in a business program for "tricks" or disguised program coding or self modifying code. Leave those gimmicks for other than business programs. You always want your business programs to be able to be modified, added to, or easily changed by yourself or someone else.

As an employer of programmers, I don't want my people to try to "code themselves" into a program. If they do, that program is less flexible and I have been gypped. It means that only the programmer who wrote it may be able to modify or maintain it. What if the programmer is sick? Or quits? Or dies? Then who can modify the program?

So, with that in mind, you realize that this discussion of GET is for other than use in a business program. Let us proceed.

I started out bad-mouthing GET. We have to look at some of its advantages in any meaningful discussion of how and when to use it. First, GET lets us look at every character as it is being input. Careful. Input accepts all the characters typed in as a string of data. For a numeric input, all the numbers typed in are accepted together as one large number as soon as you hit RETURN. INPUT accepts all the letters and numbers you input to an alphanumeric variable as one piece of data as soon as you hit RETURN. GET doesn't use RETURN. GET doesn't need it. INPUT shows the characters you are entering. GET does not. Let's try an example.

```
]LIST

 7  REM EXAMPLE 1
 8  HOME : PRINT
 10  PRINT "INPUT TEST": PRINT
 20  INPUT "ENTER YOUR FIRST NAME
     ";NA$: PRINT
 30  PRINT "GET TEST": PRINT
 40  PRINT "ENTER YOUR FIRST NAME
     "
 50  GET B$
 60  PRINT : INVERSE
 70  PRINT "THE TEST IS OVER": NORMAL
     : PRINT : PRINT
 80  PRINT "INPUT LET YOU PUT IN "
     ;NA$: PRINT
 90  PRINT "  GET LET YOU PUT IN "
     ;B$: PRINT
```

Enter example one into your Apple][. Now run it. Use the same name for both the INPUT test and the GET test. What did you notice? For INPUT, you could have noticed that your entire first name was displayed — a character at a time on the screen until you hit RETURN. It also stayed on the screen. It was on the same line with the message "ENTER YOUR FIRST NAME." Look at the GET test. You were unable to see the character being input through the keyboard. You didn't have to hit RETURN. GET would only allow you to input one character.

What if you have a need for GET, but you also want to see the characters as they are being input? What if you have a need for GET (we'll determine that later) and you have to be able to put in more than one character? Let's look at example two.

```
]LIST

 7  REM EXAMPLE 2
 10  A$ = ""
 20  B$ = ""
 30  GET B$
 40  IF B$ = "E" THEN 80
 50  A$ = A$ + B$
 60  PRINT A$
 70  GOTO 30
 80  PRINT "THERE ARE "; LEN (A$);
     " CHARACTERS
 90  END
```

Notice lines 10 and 20. A$ and B$ are set equal to null. There are no hidden control characters there. In line 30, GET gets one character at a time. Even though, according to the syntax of Applesoft, B$ can contain up to 255 characters, GET puts only the latest keyboard character you typed into B$. Whatever previous character existed in B$ gets overwritten. Effectively, it is as if you were coding:

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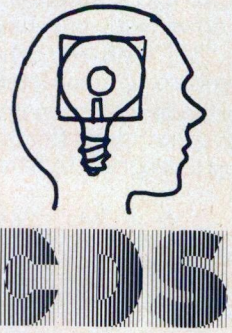

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```
100B$ = "A"
110B$ = "B"
120B$ = "C"
130B$ = "D"
```

and so on when you are really just using GET and typing "A", "B," "C," and "D".

Line 40 is a concession to programming logic. (After all, we are programming). In order to stop the program from "getting" more data we just have to type an "E" and we will branch out. You see, Ctrl C will *not* cause the program to interrupt here. Try it. See what happens. The prior output characters just keep repeating and no other characters show. Try running it two ways.

First, type RUN, then enter keys "A" "B" "C" "D" and "E." The display should show a message that says "THERE ARE 4 CHARACTERS." Second, type RUN again and key in "A" "B" "C" "D" then Ctrl C, then Ctrl C, then another Ctrl C and finally "E." This time the message should say "THERE ARE 7 CHARACTERS." Even though you can't see them printed (or in this case displayed on the screen) they are there. [By the way, for your information, to enter Ctrl C you first hold the Ctrl key down with one finger then you push "C" with the other. It is called a control C character and is useful for some of the more sophisticated programming efforts (as well as causing a program to be interrupted.)]

Line 50 is our way of keeping all the characters that we enter into the program through the GET command. The first time we execute line 50 in our program, A$ = null and B$ = whatever key we pushed first. In our A-B-C-D test, the first time through line 50 B$ would equal "A." After line 50 was executed, A$ would also equal "A." The next time through line 50, in our A–B–C–D test, B$ would equal "B."

After we had executed line 50 the second time, A$ would equal "AB." If we entered "C" the next time, then after the third pass through line 50 A$ would equal "ABC".

Line 60 is our way of verifying which "normal" keys had been pressed. Since GET doesn't display the pressed keys and we want that to happen, we just PRINT out A$. NOTE — if we only wanted to see the last key pressed, we would have PRINTed B$.

Now, why would you want to use GET? Perhaps you own your own business. Do all employees have access to all your data? Probably not. How do you discriminate against those who don't have "a need to know" from those who do? You could use a password. Example three demonstrates how a password would be used to allow only certain individuals to access your data. You can use this routine in your own programs if you want. No charge. You're welcome.

Again A$ and B$ are set equal to null. Line 30 clears the screen and lets us start our output at the top of the screen. Line 50 lets us input the characters of our password without revealing them on the screen. A$ accumulates them in line 60, and line 70 checks the number of characters we input. When six characters have been input, program control jumps to line 90, where the message: "THERE ARE 6 CHARACTERS" is displayed.

Lines 100, 110, 120 and 130 test the password that was enetered against those I chose as valid. If there was a match, then the message: "THE SYSTEM ACCEPTS YOU" is displayed from lines 300 and 310. If unauthorized users try to get on your system, then there would be no match, and the message: "YOU ARE NOT AUTHORIZED" will be displayed. I can see three major uses for the GET command:

1) in high security programs, testing for authorization.
2) in modem (over the phone-lines) operations.
3) in word processing programs.

If you are interested in the MID$ function, then I'll talk about that in the next 'Mash. Although I promised it this time around, I got overruled.

```
]LIST

7  REM  EXAMPLE 3
10 A$ = ""
20 B$ = ""
30  HOME : PRINT
40  PRINT "ENTER YOUR PASSWORD": PRINT

50  GET B$
60 A$ = A$ + B$
70  IF  LEN (A$) ) 5 THEN 90
80  GOTO 50
90  PRINT "THERE ARE "; LEN (A$);
     " CHARACTERS"
100  IF A$ = "VAL932" THEN 300
110  IF A$ = "MYK023" THEN 300
120  IF A$ = "DIK444" THEN 300
130  IF A$ = "CRT963" THEN 300
140  PRINT "YOU ARE NOT AUTHORIZE
     D "
190  END
300  INVERSE : PRINT
310  PRINT "SYSTEM ACCEPTS YOU": NORMAL
```


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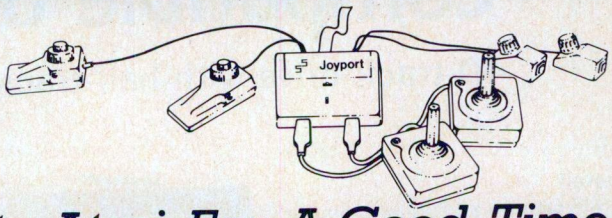

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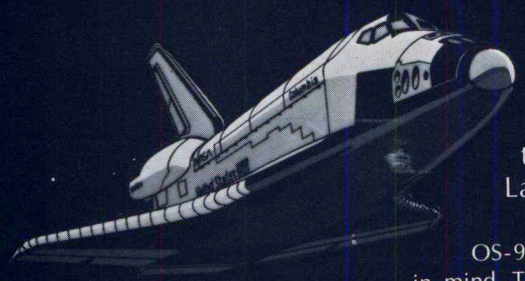

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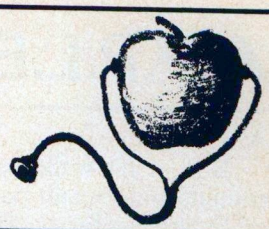
A.P.P.L.E. DOCTOR



Henry Roberts

I received a letter from Dr. Andre Juvenelle of France pointing out that my recollections about Blaise Pascal were faulty. His letter pointed out that Pascal was the son of a French tax collector and at the age of 18 invented the first calculating machine. He later discovered the laws of atmospheric pressure, liquids equilibrium, arithmetic, triangle, probability calculus, cycloid theory and the hydraulic press. Furthermore, he is considered a major French Philosopher, but above all, is recognized as a scientific genius.

All true and more. I stand corrected. That's what I get for an off the cuff lead in, based on a half remembered lecture in graduate school.

This is as good a time as any to remind everyone that I don't pretend to be all knowledgeable about Apple computers. So far, I have received letters from people wanting to modify software I don't even own and have never used. Other problems don't have simple solutions.

As an example, I have received several letters from people who want to modify copy protected software, or otherwise use it in ways not intended. By its very nature, copy protected software is difficult to "get into." For this reason, taking apart copy protected software is beyond anything I could describe here... Then, of course, I am stronger in some areas than others. If I don't know something, I attempt to look it up. Sometimes, this doesn't help, in which case, I'll refer your letter to someone who may know, or ask our readers for input. So, to paraphrase a religious saying: please be patient with me, I'm not finished learning about Apples yet.

Question:

I just got the Apple Pascal version 1.1. I am all excited in using the same. I have several questions on the use of Pascal. I will limit to four this time.

1. *Can I use the Pascal Editor to create BASIC programs (Integer and Applesoft)? If so, can I transfer the files between Pascal and BASIC environment?*
2. *Can I run Pascal generated programs on a machine without a Pascal operating system?*
3. *I have a printer attached to slot #2. I have to run the attached BASIC printer routine before using the printer. How can I do this in Pascal?*
4. *Are there still many bugs in Pascal version 1.1? Where can I get information about known bugs?*

Answer:

Whew! I bet I could get a whole column out of that! Those are good questions. O.K. let's take them in order!

BASIC programs are not stored in memory the same way they appear on the screen. As an example, the BASIC command "FOR" appears in memory as $81 (the "$" means hex). BASIC interprets this when you list the line and writes the word "FOR." This makes BASIC programs execute faster, since part of the interpretation is already done.

The Pascal editor is used to create text files. Pascal (the language) cannot edit text files. An uncompiled Pascal program is just like it looks... character strings. The source program is a text file, but the object code is a code file.

Good news, though, if you use the DOS EXEC command, a text file can be loaded into memory as a BASIC program. Just type EXEC [file name]. There is a hitch though. Read on.

Running a Pascal program on a non-language card system requires a special run-time package. A good example is WIZARDRY which is written in Pascal, but runs on non-language card systems. The Pascal compiler generates something known as P-code. This does require a P-code interpreter in order to execute the program. This P-code interpreter normally resides in the language card. I don't know of anyone (except Apple) who has relocated the interpreter. If anybody knows how to make Pascal runtime packages work on non language card systems, I would appreciate hearing from you. The second part of the problem is that language system files are structured differently from DOS 3.3 files. The formats must be converted. There are two programs listed in the Oct. and Nov-Dec. 1981 *Call -A.P.P.L.E.s* which transfer files between formats. The programs are named "HUFFIN" and "PUFFIN." These can be entered by hand.

To access your printer from Pascal get the ATTACH.BIOS package from International Apple Core, 910A George St., Santa Clara, CA 95055, $7.50. This set of routines will usually take care of your interface problems. If the printer is non-standard, a special driver routine has to be installed using ATTACH.BIOS. But most printers are recognized by the system and work properly with Pascal only if the interface card is installed in slot #1. The BASIC program you now use takes a little bit of doing to convert to Pascal. The trick is in the pokes. You have to trick Apple Pascal into doing them, or call a machine language routine which pulls six bytes off the stack and uses the fifth one. (Pascal passes arguments via the stack.) The trick to implementing pokes in Pascal can be found in the July/August 1980 *Call -A.P.P.L.E.*

You asked about known bugs. I do not claim to be an expert on Apple Pascal, but I haven't read of any in this magazine. Frankly, *Call -A.P.P.L.E.* is the *best* place to learn of bugs and what not.

QUESTION:

I would like to know if you know of anyone who has a "fix" for Applewriter to use the real shift key, if the keyboard has been modified. If not, is there a word processor on the market for the Apple][plus that uses the shift key. Really, I'm looking for the simplest word processor that a layperson who is used to the typewriter can easily use. If you could see "what you type" (simulate 80 columns) that would even be better.

A.P.P.L.E. DOCTOR

ANSWER

Run, don't walk, to your nearest computer store and purchase a copy of Super Scribe II. On page II, it directs you to the appendix where complete instructions are given to modify your Apple. Also, Super Scribe II will display upper and lower case 70 columns across without special hardware! I have used three word processors, and Super Scribe II is the best so far. Right now, I am still using Programma's text processor. The next text processing job, though, will use Super Scribe II.

QUESTION:

To aid with the entry of large amounts of numerical data into Visicalc, I purchased by mail a California Micro Product KBAII Numeric Keyboard. This unit works fine — except with Visicalc! Gnash! Gnash!

It interfaces by way of a card inserted into one of the peripheral slots (a shame, but still) and is accessed by entering POKE 1276,128 [C/R], IN#4 [C/R]. (with slot #4 expected)

As stated previously it does work well, except that as soon as a program is loaded it seems to get overwritten and becomes nothing better than a pencil holder.

I have tried to work the problem out from the reference manual and the instructions which came with the keypad, but to no avail. Is there a location address where a suitable instruction (?) can be lodged, so that the unit can be used whenever my Apple II plus is booted?

Still Another Question with the same Answer:

I have had an Apple][plus and have accumulated a number of commercial programs. Recently, I purchased a 10 meg Corvus disk drive with the understanding that it was completely compatible with my existing equipment. This is true, but you have to put the Corvus controller card in slot six and the floppy disk drive controller card in slot four. Now everything works fine except a number of my commercial programs (Visicalc, Master Disk Catalog, Sands of Mars) are slot six dependent. To run these programs, I have to take my computer apart and interchange my controller cards. Is there a way to put the Corvus controller card in another slot so that the floppy disk drive controller card can go into slot six? If not is there a patch or soft switch available to do this without physically doing it? Also, is there a way to use bit copy programs to copy locked disks to a Corvus?*

ANSWERS:

The answer to the last two questions is the same. Programs which are copy protected generally can't be modified or made to work any way other than intended by the manufacturer of the program. What does this mean? It usually means that one of the first things a program like Visicalc does is to perform a monitor reset function. This turns off all slots and prevents the program from misbehaving. Unless you can uncopy-protect Visicalc, there isn't much that can be done to keep it from turning off your keypad.

As far as the second question is concerned, you have the same problem. I did check Visicalc and Sands of Mars. Both booted and seemed to run from slot seven. I did use the 16 sector version of Visicalc. A number of programs wouldn't boot correctly, however (mostly games). This is because of the software copy protection methods used by the programs. Once again, unless you can unprotect the programs you're out of luck. Nibble copiers generally won't help transfer your programs to Corvus. I'd contact Corvus and see if they will help you modify their software to work out of slot four. It certainly will be a lot easier.

**Editors comment: Programs that are slot dependent reflect the result of lack of forsight on the part of the programmer, and are what we consider as sloppy programming practice.*

QUESTION:

Reference Applesoft String Swap in Jan, '80 issue, by Randy Wiggington.

I have a problem in that I use tape Applesoft vs. ROM. Previously, I have converted program JSR's or JMP's to ROM addresses — $D000 = $800 — with fair success, as $1025 vs. $D823 for the re-entry to Applesoft in the S.H. Lam monitor routine.

In the reference program, this isn't working. The program contains JSR's to $DFE3 and $DEBE. The nearest routines appear to start at $17E6 and $16C0 in the RAM version.

I may be making an unwarranted assumption in assuming that RAM Applesoft and ROM Applesoft listings are the same, except for addresses.

Could I have the first few instructions beginning at $DFE3 & DEBE.

ANSWER:

Your hunch was right about RAM and ROM Applesoft not being the same. One of your ROM locations appeared to be the same; the other was two bytes off. $DFE3 appears to be the same as $17E6, but $DEBE probably should be $DEC0. I am listing the first few bytes of both locations you requested.

```
DEBE:  A9  2C      LDA   #$2C
DEC0:  A0  00      LDY   #$0
DEC2:  D1  B8      CMP   ($B8),Y
DEC4:  D0  03      BNE   $DEC9
DEC6:  4C  B1  00  JMP   $B1


DFE3:  A2  00      LDX   #$00
DFE5:  20  B7  00  JSR   $B7
DFE8:  86  10      STX   $10
DFEA:  85  81      STA   $81
DFEC:  20  B7  00  JSR   $B7
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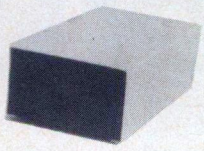

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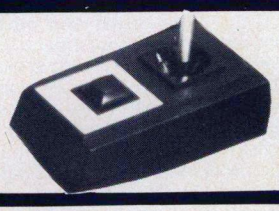

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A.P.P.L.E. DOCTOR

QUESTION:

I wonder if you could explain why the Apple languages Applesoft, Pascal and Fortran have used only 32-bit floating point numbers which will give only six-seven place accuracy. Microsoft Basic-80 and Fortran used with the Z-80 Softcard offer the additional double-precision numbers with 64 bits.

Most of the programming that I do involves mathematical and statistical calculations which require double precision numbers to maintain accuracy when adding a lot of large squared numbers. I am also puzzled how Applesoft and Pascal are able to handle financial calculations which even for one million dollars requires 10 places with cents.

ANSWER:

First of all, let's clear up a misunderstanding.

Applesoft gives nine significant digits, while Pascal and Fortran give only six-seven. The difference in precision is due to the different interval formats for real numbers. The Applesoft Manual states this on pages four and five. I checked this against a Texas Instruments SR 56 calculator which calculates to 13 places internally and displays to 10 places. To summarize the results, both Applesoft and the scientific calculator produced identical answers for the first nine digits. Applesoft did round up as required. For example, the square root of two is 1.414213562. Applesoft returned the first nine digits. The square root of three is 1.732050808. Applesoft returned 1.73205081. The "08" on the end rounded up to "1." Floating point numbers can have exponents to the 38th power positive and 39th power negative. Back when I took Chemistry and Physics, they taught me that my answers were only as accurate as my least accurate measurement. Number-crunching programs often need double precision in order to prevent an excessive propagation of round-off error. The accuracy of the result is a function of the precision uses (among other things). It is derned difficult to measure something to nine significant digits... actually measuring it to six or seven places is hard. Therefore, nine significant digits is probably enough for most scientific applications. I queried a Statistics professor at the local university, and he responded that calculation to nine significant digits was more than sufficient for most applications, probably including yours. If you feel you still need more digits, read on.

On the subject of dollars and cents, I queried BPI (who markets one of the major general ledger packages for the Apple][) on the subject and BPI offered the response that million dollar corporations generally don't try to do their bookkeeping on an Apple][computers. There are more problems involved than just the number of significant digits the computer can handle. As an example, file sizes are too large to handle easily. Incidently, Applesoft was written by Microsoft (hence the similar names).

Pascal! The manual speaks of 32 bit floating point numbers, but on page 19 of the language reference manual (the newer one with the pretty cover) they describe "long integer type." This can give you a maximum of 36 digits without rounding error! This could handle calculations involving the national debt! The long integer type is internally represented by BCD (Binary Coded Decimal) digits. BCD operations do not give the customary roundoff errors. It would appear that the folks at Apple and Microsoft thought 64 bit floating point accuracy would not normally be useful in a microcomputer.

QUESTION:

When I have tried listing Integer Basic programs that have interesting graphics, the programs look like gibberish—no line numbers, long series of HIMEM's and ?'s, etc. Has this been done deliberately to prevent plagiarism? Or is it a way of integrating machine language and BASIC programs? If the latter, is there a source (magazine articles, books, etc.) for learning how to figure out what is being done in these programs? Are they still useful or are there other methods which achieve equal or better results?

ANSWER:

The gibberish you are seeing is indeed a machine language subroutine. It was a common practice to include such routines in early Integer Basic programs. This was not done to confuse the user of the program, but rather to make loading and running of the program easier and less tedious from cassette. The alternative would have been to load the BASIC program, jump into the monitor, and load one or more machine language routines. Usually these routines were the Hi-Res graphics program and the shape tables needed to produce those nice graphics you like. As you can see, this could be tiresome if loaded separately.

The use of disk drives made it possible to include the load statements within the BASIC program. This is preferred, since it leads to less heartache and problems. To load the routines, just have a print statement or two which prints Ctrl D;"name of routine." Including the machine language portions of a program within the BASIC program requires moving the pointers around, then moving the subroutines themselves to the locations where they will actually be used. There is a publication called *Best of Contact '78.* It was published by Apple Computer. On pages 14 and 15 it describes several techniques of including machine language routines as part of a BASIC program. Good Luck!

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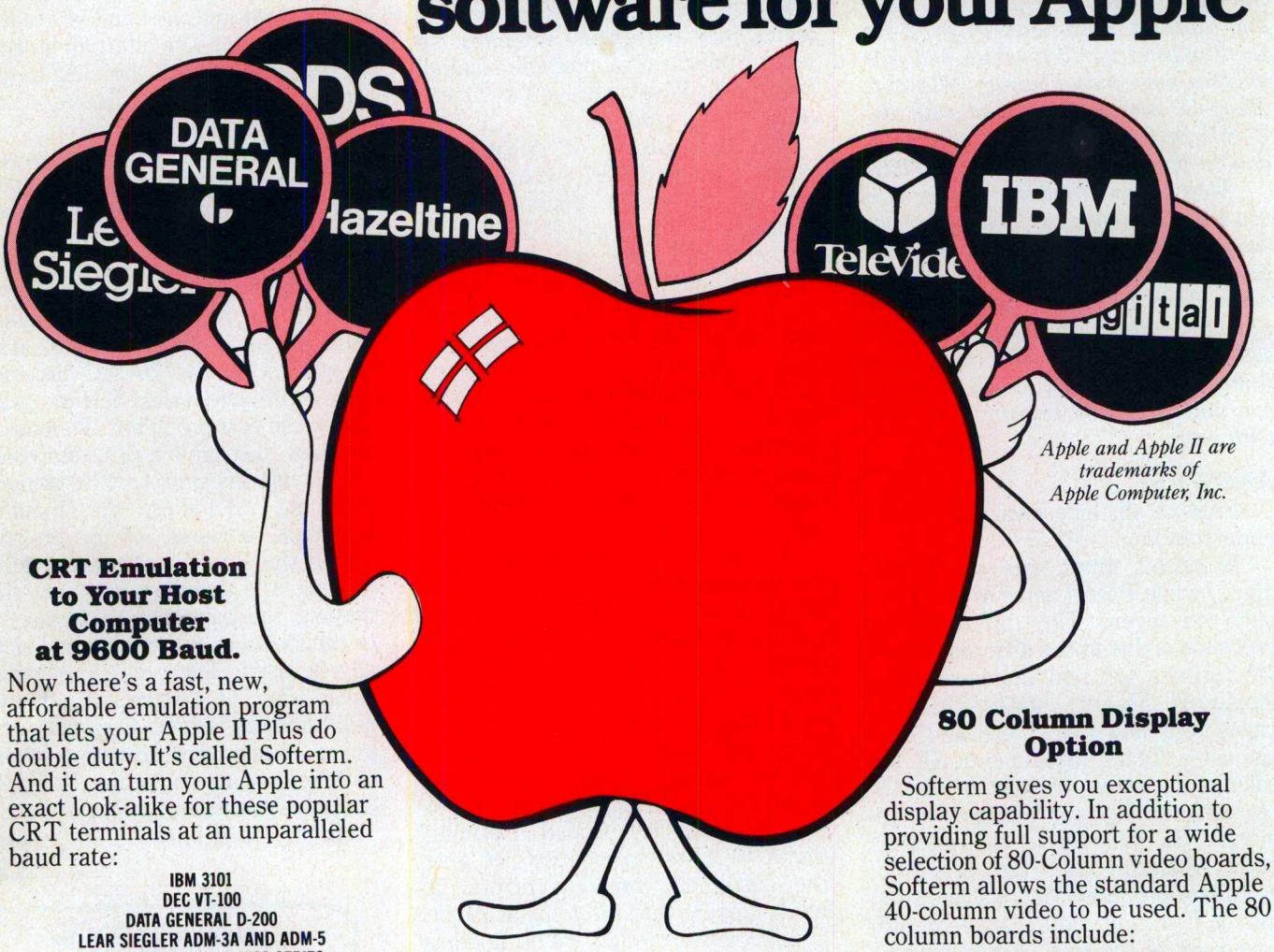

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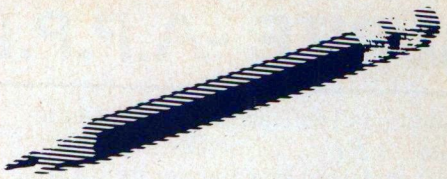

By the Readers

Dear Val,

THE article "Get the Most from your Diskettes" in Vol IV, Number 3 was long needed. About 90% of my diskettes do not have DOS, but I do not use track 0. I use Super Disk Copy from Sensible Software (which will INIT a disk without DOS) as my main copy program. Since it is copy protected and uses its own DOS, I can't modify it to use track 0. Also, I think it is more reliable than FID type programs and it cost me good money so I won't give it up.

Enclosed is a program for those who don't have a program to INIT a disk without DOS. It is just four POKEs to prevent DOS from copying itself onto a disk when initializing. It also sets the VTOC to show tracks one and two as free space. After running the program the INIT command works as usual except there will be no DOS on the disk initialized.

James A. Gant
4941 NW 26th
Oklahoma City, OK 73127

```
]LIST

5  HOME
10  REM

No DOS INIT

This eliminates the routine that
puts DOS on the first 3 tracks

30  POKE 46922,96: POKE 46923,234
     : POKE 46924,234
40  REM

This changes the routine that
sets up track bit map on INIT
to show tracks 1 and 2 as free

70  POKE 44723,4: PRINT "DOS NOW
    MODIFIED AND WILL NOT BE PLA
    CED ON DISK BY INIT": END
```

ANOTHER READER has come up with an interesting alternative to force DOS to read a Track/Sector list pointed to Track 0. Read on.

Dear Val,

I have discovered that the T/S entry "80/00" (hex) when encountered will cause DOS to read track 0, sector 0, without hitting E0F as in "00/00." It is therefore feasible, for a fixed length file, to create your own T/S list using $80 to denote track 0.

Neil R. Ayer, Jr.
292 Bridge St.
SO. Hamilton, MA 01982

Dear Val,

Being a new member of *A.P.P.L.E.* I am constantly amazed at some of the programs that you offer. Disk/Tape Backup is one such program that I am pleased with. My thanks to Grant Schenk. Also, I would like to thank Eric Lambrecht for his Restore and Lower Case Killer programs.

These programs alone are more than worth the cost of the membership fee. Keep up the good work.

Rod Crandall
2760 Associated Rd.#7
Fullerton, CA 92735

WE PLAN TO PUBLISH several more utilities by Lambrecht.

Dear Val,

I am writing about the neat review article by Bruce Detterich on the Epson MX-100 in the February issue (which just arrived and was devoured today).

The article lists control codes for four character types: normal, small, expanded, and bold, but in fact the Epson has six character types if one includes viable combinations of two of those listed. These additional two combinations include (in the author's terminology) "small-expanded" [codes CHR$(14) + CHR$(27) + "E"].

There is another cute trick available on the Epson that Bruce didn't mention. You can address the printer to double-print the entire line by use of code CHR$(27) + "G". The double-printing of the entire line is in addition to double-offset printing of each character in "emphasized" mode, and obviously produces darker, higher quality types (four defined by Bruce plus the two described above). To cancel the double-print use code CHR$(27) + "H".

This means that the user of the Epson MX-80 or MX-100 can address by software control up to 12 distinct type-styles. The fly in the ointment is (as Bruce indicates in his table) that the "expanded" character type, used either alone or in combination with "small" or with "bold," will self-cancel at the end of every line. None of the other control codes are self-cancelling. Another potential operating inconvenience arises from the fact that several of these codes affect the entire line regardless where in the text they may be inserted, while others influence only the subsequent characters.

But, like Bruce, I feel the advantages of the Epson far outweigh some of the awkwardnesses which do border on the trivial. But, when do you suppose the Japanese marketing firms will start hiring Americans to write their manuals.? (How's that for provincialism?) I have not seen the most recent edition, but the earlier one is the most incoherent manual I've ever run across, in contrast to the sound engineering of the printer.

By the way, the MX-100 almost seems tailor-made for the Apple ///, if one uses the Epson 2K serial buffer connected to the serial port of the Apple ///. There is no funny business with high-bit bypassing or need for the "ubiquitous Ctrl I 80N shuffle" when using the Epson with the Apple ///. Just open an output file for the printer driver and fire away.

John M. Miller
230 Senate Loop
Fairbanks, AK 99701

Dear Val,

When programming in Applesoft, I load P.L.E. and A.P.A. below DOS. A.P.A. is an improved renumbering utility which is part of the Apple DOS Tool Kit. When I read about DOS Mover in "Loading DOS 3.3 on the Language Card," *Call -A.P.P.L.E.*, July/August 1981, page 9, I decided to use it to get more RAM for my Applesoft programs. The *Call -A.P.P.L.E.* articles (there was an

[additional] note about DOS Mover in *Call -A.P.P.L.E.* Nov/Dec 1981, page 81.) explained how to relocate P.L.E. but not A.P.A. The DOS Tool Kit relocation programs do not work with DOS relocated into the language card.

An article in *MICRO,* May 1981, page 81, "Protecting Memory from DOS", describes how to modify a master diskette to load DOS at a lower than normal location in RAM. Using this modified DOS, I was able to use the DOS Tool Kit relocation program to relocate A.P.A. beneath P.L.E. with DOS in the language card.

When DOS Mover places DOS in the language card, P.L.E. is located in RAM above $B900. A.P.A. has a length of $E1F. Thus, A.P.A. should be located to start at $AAE1. To do this, we do the following:

(1) Modify byte $04 on track 0, sector A of a 48K master DOS to read A9. This modification can be done by using commercially available track and sector programs. The modification will cause DOS to boot below $A9FF.

(2) Set HIMEM to $B900 by using the monitor, or POKEing: POKE 115,0 : POKE 116,185.

(3) RUN LOADAPA from the DOS Tool Kit.

(4) BSAVE RELOCATED.APA, A$AAE1,L$EF1.

Abe Korn
20 Beatrice Lane
Old Bethpage, NY 11804

Dear Val,

We would like to come down heavily on both feet in favor of the beliefs expressed by David Lingwood in his article last month [April] on copy protection.

We have written and distributed a graphics package for Apple computers called The Superplotter. It is not locked and is written in Applesoft. We did not lock our program for two reasons: we wanted our users to be able to interface our program with other programs (statistical packages, graphics dump software, etc.). We also wanted to allow our more sophisticated users a chance to "customize" our program if they so desired.

We know that our disks have been illegally copied. We even know in one instance, that a hospital bought another computer so they could run our package and didn't even bother, after spending thousands on hardware, to order another package. That's the breaks. We don't like it, but we question, in most cases, whether people who are that dishonest would have bought the package on the up and up anyway.

We have run into an interesting program that is being implemented by certain state school boards... That is, that a school district will buy unlimited rights for re-copying a program for use in their schools — we think that this is an interesting solution to a hairy problem, by one of the worst offenders!

Now, I would like to address a comment to hardware suppliers. We have found that we are not only in the business of selling software, but also in educating our buyers. Many, it seems, have been sold printers to dump their graphics to, without being told that they also need a [special] interface card or graphics dump software. This is not an isolated problem which occurs only rarely. We can't understand why a dealer selling a piece of equipment worth, in many cases thousands of dollars, would neglect to spend a little time making sure that it is set up to do what the customer is buying it for.

Gordon Lee Dickens, P.E.
Dickens Data Systems
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- 3 Hardcopy formats with 3 selectable line lengths. Any printer initialization string can be sent to output slot.
- Locate all track/sector lists on a disk.
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- Ability to mask display to show inverse and flashing as normal mode characters.

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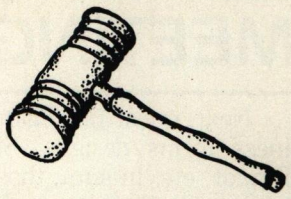
A.P.P.L.E. MEETING MINUTES



David A. Lingwood/Secretary

March 16, 1982
A.P.P.L.E. Offices, Renton

PRESIDENT Dick Hubert called the meeting to order at 7:35PM, with 92 members and guests present.

Old Business:

December 15, 1981 meeting minutes were approved as published in Call-A.p.p.l.e.

Committee Reports:

Mike Thyng reported on the upcoming Apple Festival at the Pacific Science Center, June 5-6. We need up to 40 machines, and members to work half-day shifts. Theme will be hands-on experience and answering of questions about Apples.

New Business:

After a general discussion of later or Saturday hours for the Club office, it was moved and approved to keep the office open *Thursday* nights until *7:00PM.* A drive-in window was suggested, and an unnamed member therefore proposed selling Big Macs at the window.

Dick Hubert discussed the Club booth at the upcoming West Coast Computer Faire.

The meeting was adjourned at 7:55PM.

Q&A:

How to turn on condensed type on the Epson MX80 and MX100? It depends on the machine, since the 100 lacks text-handling capabilities of the 80. A quick report on the Micromint modem board indicated that it has no interface card — you need your own serial card of some sort. How to handle a 96K Visicalc template (a shoehorn, maybe?). Plus other questions, many of which indicated a turn toward more applications-oriented concerns among many members.

Speakers

"Hey, shut up back there. This is the A.P.P.L.E. meeting, not a cattle barn!" Thus spake the Micromint SweetTalker board into the babble, quieting down at least those first rows that could hear its one-watt output. Dave Lingwood did a demo of this latest brainstorm of Steve Ciarcia. A phoneme speech synthesizer, driven by software attached to the output hooks, it *talks* what your BASIC program prints.

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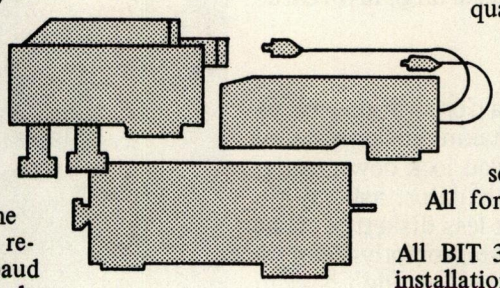

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MEETING MINUTES

Next, guest Jim Egan discussed the problems of business forms designs. Stock forms available, ways to format, etc. In sum, those of us who just "dump it out" have some learning to do before we can be truly professional.

April 20, 1982
Omega Computers, Seattle

When Dick Hubert called the throng to order at 7:35, 64 members and guest present.

Old Business:

A correction was approved to the minutes of the annual meeting whereby the (blush) secretary missed Ted Butler as the real chair of the tellers' committee for the elections. Sorry, Ted.

Committee Reports:

Mike Thyng again reminded us of the June 5-6 Apple Festival (see March minutes).

New Business:

The Thursday 'til seven hours for the Club office will begin in May.

Dick Hubert reported for the Treasurer that March income was approximately $228K, with expenses of $226K, and $250K in the bank. We now have 19 full-time office staff.

Val announced that MAC Language Card is now available. A symbol cross-reference is available for $7.50 for those who don't have a language or RAM card. DICE 82 is also on disk, and Roger Wagner's book **Assembly Lines** has arrived.

Other announcements covered the PKASO card that dumps][or /// HI-RES for the Epson printers; the upcoming availability of micro-oriented literature files through Lockheed's DIALOG system, etc.

The meeting was adjourned at 7:58PM.

Q & A:

No one knew for sure how to communicate with the IBM 3780 protocol. General discussion of large RAM cards and Visicalc expansion.

Speaker

Jim Grimshaw from Control Data Corporation took us through the intricate business of making diskettes, and some history of CDC itself. When you look down to the surface of your disk, under the calculator, ashtray (!), pieces of printout, and buried jacket-less diskettes, what Jim said makes you shudder. You also promptly clean *up* the place! Dust, crud, etc., and diskettes shouldn't have to mix. Knowing the tremendous R&D and engineering — even to the radius of the black cover edges — you feel guilty for how you treat these wonders.

More density? Yes, the diskettes can do it easily. Drive head resolution is what limits us to 48 tracks per inch. There are 96 TPI drives now, and the industry is heading toward the 100TPI "barrier." By the late '80s, 5¼ inch diskettes will be a *big* market, somewhere over 300 million units per year.

So — treat your diskettes well, and reflect that without them we'd all be using cassette tapes.

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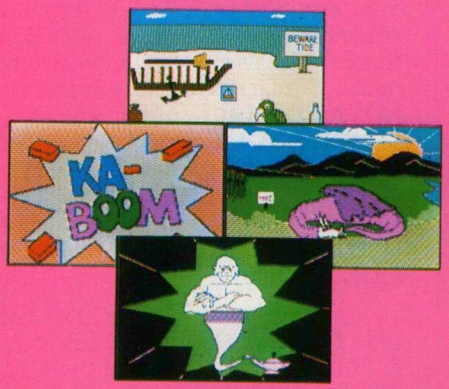

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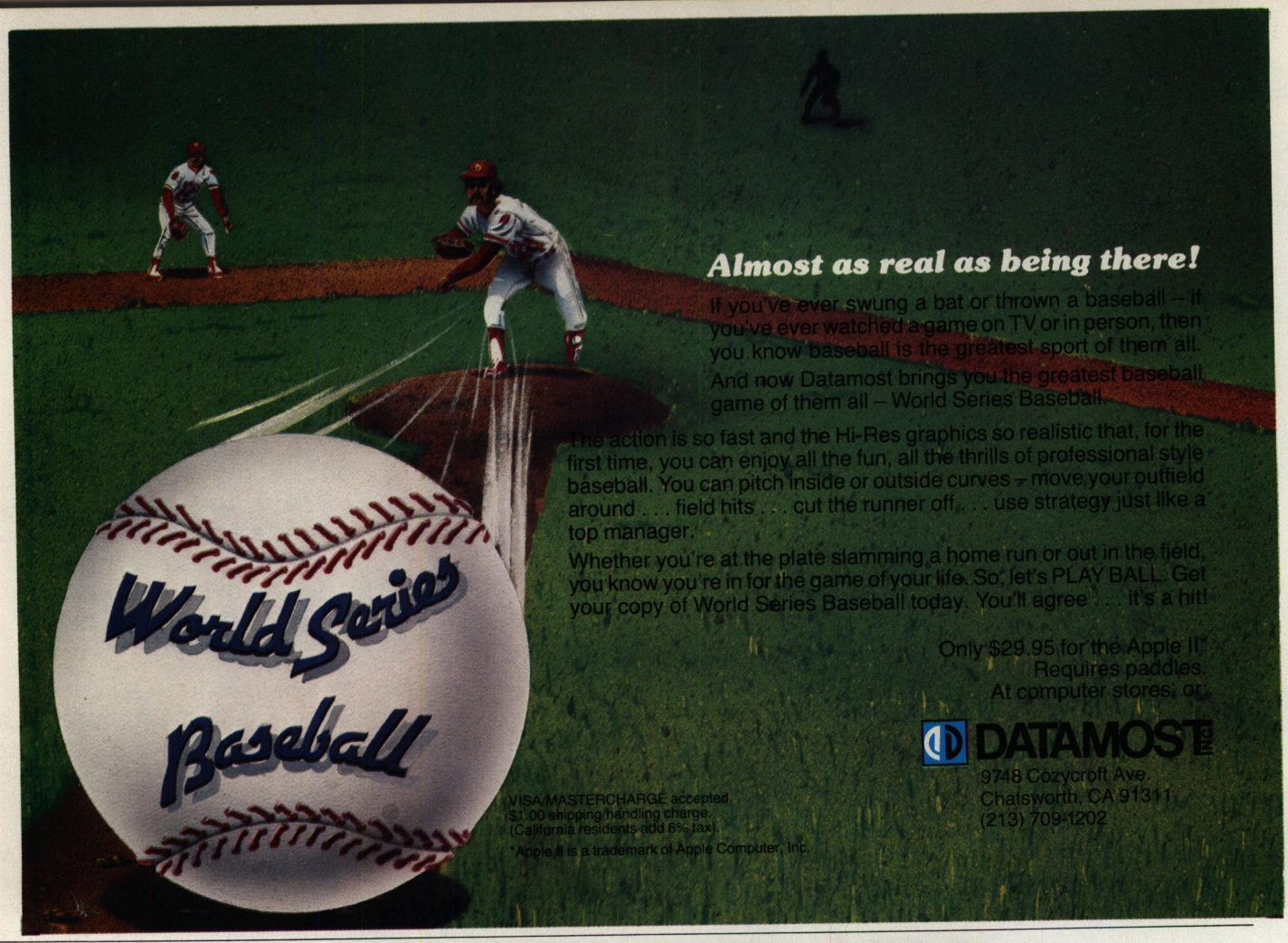

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A LIVE WIRE

Val J. Golding

SOME months ago we wrote on the proper use of the Call -A.P.P.L.E. Hot Line, and as our membership continues its rapid growth, we thought this might be an appropriate time to acquaint our new members with this service, and for the information of all, describe its beginnings.

First mention of the Hot Line appeared in the July, 1978, Call -A.P.P.L.E., which listed the newly-installed number, and briefly described the service, which was (and remains today) located in the basement of our (the editor's) home. Interestingly, the goals we set with that small announcement hold just as true today: to assist members with questions [answering programming problems], or referring them to some one [who specialized in their field of inquiry], who might be able to reply. Starting with the September, 1978 Call -A.P.P.L.E., the front cover listed telephone numbers for our consultants, a practice to be followed by some of the many—just now emerging—user groups.

In early 1980, when Call -A.P.P.L.E. became our full-time occupation, Hot Line hours were more than doubled to offer daytime service. Today the Hot Line handles upwards of 6000 calls from members and individuals each year. This could loosely be interpreted as saying about five out of eight members have availed themselves of the Hot Line during the last year.

As our rolls grow, so do our roles. The Hot Line becomes just a little bit busier each day. This in turn gives us the opportunity to tell you a bit about it, while at the same time how show you can help improve its efficiency.

Hot Tips

Hot line hours are from 9 AM to 3 PM and 6 PM to 10 PM, seven days per week. These hours were established only after considerable thought, and provide the maximum possible service hours to members in all time zones, while also allowing an uninterupted work period for ourselves. Our normal course of business requires we occasionally leave the telephone for brief periods, attending meetings or such mundane things as an emergency run to buy cat food. In these instances, a message recorder is normally on the telephone line. If you reach the recorder, please leave your telephone number first, including area code, your name, membership number, and the subject of the call. Knowing the subject can sometimes help us look up information before returning the call.

It is important to be aware of time zone differences. If you reach the recorder late in the business day, try to also leave your home phone number. If you are calling from the east coast, and you call before noon (9 AM Pacific time), you are likely to reach our recorder.

Our local membership comprises only a small percentage of the total, thus the large majority of our calls are long distance. If you are asked to hold, we are most likely on the other line assisting another long distance caller with a problem. If requested, overseas calls will be given priority; all others will be handled *strictly in the order received.* Once we have taken your call, we will then be able to give you our undivided attention.

You can play a major role in improving the Hot Line efficiency and reducing waiting time for other members by preparing yourself beforehand with notes relating to your question or questions. For example, if you have a bug in a program, having a printout of it may prove helpful, or a list of possible causes for the error which you have already ruled out.

Some Hot Numbers

Questions relating to joining A.P.P.L.E., membership, orders and shipping should be directed to the general office at (206) 271-4514. Call -A.P.P.L.E. display advertising rates and information are available from our advertising representatives, Grawin Publications, at (206) 223-0861.The Hot Line number itself remains (206) 932-6588

Another service of A.P.P.L.E. that goes hand-in-hand with the Hot Line is our A.P.P.L.E. Crate Bulletin Board, at (206) 935-9119, which can be accessed by members and readers with telecommunications capabilities. Here can be found, in addition to the expected message service, meeting notices, new product information, programming tips, and the A.P.P.L.E. Doctor, an alternative means of providing programming and technical assistance.

Page 2 of each issue of Call -A.P.P.L.E. has a complete listing of names and home telephone numbers of club officers and directors, and technical consultants whose field of expertise is listed with the name. Our consultants are all unpaid volunteers who generously donate many hours to answering members' questions. Please give them every consideration. In particular we ask you check their area codes and know what *their* time is before placing the call. The Hot Line is equipped to answer most questions of a general nature, excluding Pascal, or can refer your question on. *Those questions of a highly technical nature, or on Pascal, might best be directed to one of our consultants.*

We are constantly looking for qualified individuals who might like to serve as one of our technical consultants. For those who are interested, please drop a note in the mail to the editorial office, indicating your area(s) of interest and qualifications. Our consultants receive no remuneration, but their valuable service is the basis of all user groups: members help members. That's what our club is all about.

With that thought in mind, we would like to personally thank all of our callers for the courtesy they have shown in keeping their calls brief and to the point, and for their contributions to our pool of Apple information and knowledge.

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PITCH AND RHYTHM Continued

```
]LIST

0  HOME : REM

POKE TONE GENERATION ROUTINE

1  FOR LOC = 776 TO 798: READ BYTE: POKE
 LOC,BYTE: NEXT
2  DATA    255,255,173,48,192,136,208,5,
206,9,3,240,9,202,208,245,174,8,3,76,10,
3,96
5  REM

FP TONE SUBROUTINE by G Jackson
Call -A.P.P.L.E : Jan. 1979

Applied by Jack Bender

10  GOTO 100: REM
JUMP TO MAIN PROGRAM

20  READ P: REM  PITCH
21  REM
USE 999 AS A FLAG TO STOP PLAYING NOTES
22  IF P = 999 THEN  RETURN
24  READ D: REM DURATION (RHYTHM)
30  POKE 776,P: POKE 777,D: CALL 778
40  GOTO 20
45  REM
DATA FOR PITCH AND DURATION

50  DATA  192,72,192,72,128,72,128,72,11
5,72,115,72,128,144
52  DATA  999
55  DATA    145,72,145,72,152,72,152,72,
172,72,172,72,192,144
58  DATA  999
100  REM

*** MAIN PROGRAM ***
105  PRINT "PLAY SOME MUSIC"
110  GOSUB 20: REM  PLAY MUSIC
120  HOME : VTAB 14: PRINT "PLACE PART O
F PROGRAM HERE.": FOR I = 1 TO 3000: NEX
T
129  HOME : PRINT "PLAY SOME MORE NOTES"

130  GOSUB 20: REM  PLAY MUSIC
140  HOME : VTAB 14: PRINT "MORE PROGRAM
 HERE.": PRINT "ALTERNATE TEXT/GRAPHICS
AND GOSUB TO": PRINT "MUSIC ROUTINE AS N
EEDED."
150  REM    ETC,ETC,ETC
160  VTAB 22: PRINT "END": END
```

```
]LIST

0  REM

This version is meant for single
play of a piece.  The ONERR
takes care of lack of DATA when
piece is over. The pitch and
duration values are also printed

1  FOR LOC = 776 TO 798: READ BYT
     E: POKE LOC,BYTE: NEXT
2  DATA    255,255,173,48,192,136
     ,208,5,206,9,3,240,9,202,208
     ,245,174,8,3,76,10,3,96
5  REM

APPLESOFT TONE SUBROUTINE
by Gene Jackson

9  ONERR  GOTO 100
20  READ P,D: PRINT "PITCH=";P,"D
     URATION=";D
30  POKE 776,P: POKE 777,D: CALL
     778
40  GOTO 20
45  REM
DATA FOR PITCH AND DURATION

50  DATA  192,72,192,72,128,72,12
     8,72,115,72,115,72,128,144
55  DATA    145,72,145,72,152,72,
     152,72,172,72,172,72,192,144

100  POKE 216,0
120  PRINT : PRINT "END": END
```

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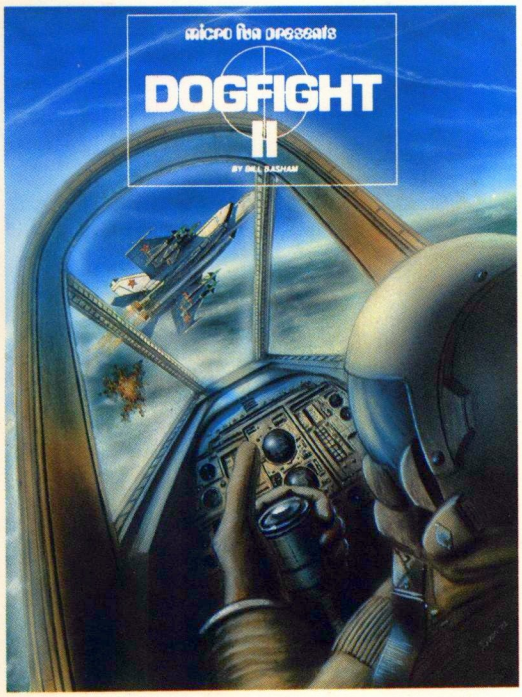

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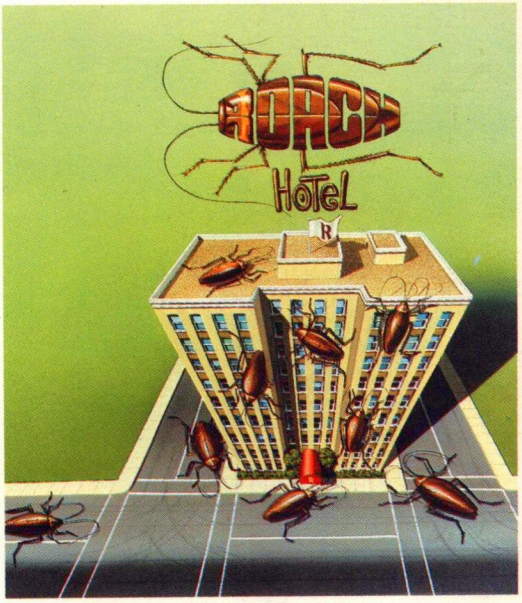

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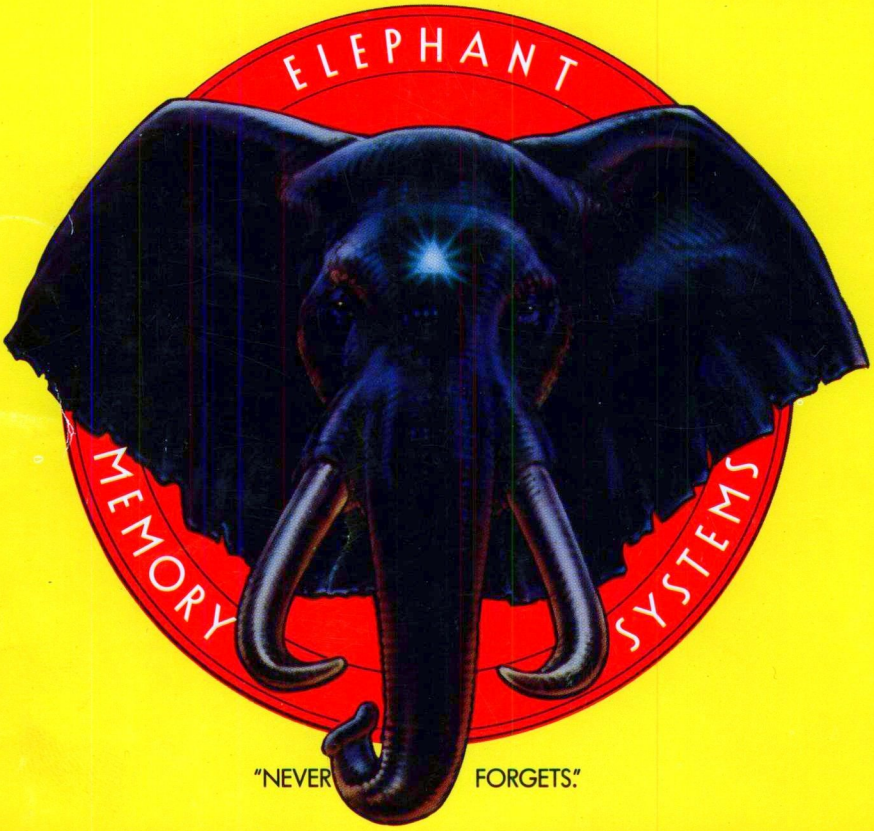

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